The Amateur's Book of
HOUSE PLANTS

The Amateur's Book of the Garden Series

Under the General Editorship of
LEONARD BARRON

The Amateur's Book of

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BEAUTIFYING THE WINDOW

By growing plants in the border outside the window, a great deal may be done to complete the idea of the window garden effect of the potted plants indoors

The Amateur's Book of the Garden Series

HOUSE PLANTS
AND HOW TO GROW THEM

BY

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PREFACE

THERE have been books on window gardens and house plants before this, and they have told, at length, of every kind of plant that under some condition or other has eked out a struggling existence in our dwellings. The purpose of the present volume is to discuss fully those plants which are *sure* to succeed. If a selection is made from the various kinds enumerated in the following pages, failure is next to impossible; it can only be brought about by carelessness and inattention to the first principles of cultivation.

Somewhat minute directions have been given for the preparation of soil, for seed sowing and for other operations in connection with each plant, and particularly as regards temperature. It should be understood that in every case these indicate the best conditions, not the imperative conditions; for success can often be achieved with wide divergence from the ideal. Still, the nearer one can

attain to the proper conditions, the better and surer the results.

Although every cultural statement made is based on the author's practical experience as a grower, yet the testimony of successful amateurs (as told in several numbers of the *Garden Magazine*) has been drawn upon in order to give encouragement to beginners. and the present edition has added, from that same source, a chapter on aquarium plants, by Dr. Bade.

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CHAPTER I

How Other People Have Succeeded

A plain statement of facts — Practical ideas in window gardens — Glass houses for forcing in winter — Heating problems solved.

A GROUP of healthy looking, vigorous-growing house plants always fills me with delight for it must be confessed at the outset that the thoroughly successful cultivation of a large number of plants in a window garden or in any part of a dwelling house is no mean achievement. The conditions with which living plants have to contend when brought into our ordinary living rooms are trying indeed. The fluctuations of temperature are usually not only great, but also sudden; light is neither uniform nor abundant; and the atmosphere is generally excessively dry. This last condition is particularly true in the winter time, when

our rooms are heated by artificial means and every degree of heat that is thus supplied for our individual comfort is taxing the energy of the plant in causing transpiration of water at a time when, normally, plant growth is at its minimum activity.

The cultivation of plants in the house, then, is very largely an individual problem of overcoming a set of opposing conditions which will never be the same for two individuals nor for the same individual in two different places. What we have to strive for is to maintain a fairly comfortable, average condition, and it is really surprising, when all things are taken into consideration, what eminently satisfactory results can be achieved. I have seen window gardens that from one year's end to another are perfect blazes of colour; in others, again, plants grown for their foliage effect alone have flourished amazingly. Yet similar plants in the homes of other people dwindled and finally died.

The ideal situation for a window garden is on the south side of the house, the window itself slightly projecting from the building line, so as to secure abundance of light,

for the sunshine is the life. In addition, just because the winter and spring sun may sometimes be too energetic for plants at rest, there should be some arrangement of adjustable shades to screen the excessive light which might be injurious to some of the younger growths in the early days of spring. Plants that have been kept in dark corners of dwelling rooms — such as palms or ferns — when brought into the window garden to resuscitate, will be thankful for such careful protection while the sun is at its hottest. Many ingenious devices have been thought out by amateur gardeners to meet the requirements and to provide the necessary best available conditions for their pets, and surely if one is about to indulge in window gardening on anything like an extensive scale, it is the part of wisdom to make a good beginning by giving them the best chance possible for a comfortable life.

It is often not at all difficult to build a small extension outside a window for the accommodation of house plants, and a little addition like this, on a slightly more pretentious scale, very easily approaches the

dignity of a small greenhouse; and in a great many respects will serve the same purpose, as for raising seeds of plants to be put out in the garden later, whether these be flowering plants or vegetables.

A PIAZZA CONSERVATORY

I know of one instance where a ten-foot-square corner of a piazza was brought into service by enclosing it with glass so that it might have been surely called a piazza conservatory. Its owner preferred to refer to it merely as a "glass house" on account of its small dimensions, but I venture to say that this small place gave more pleasure, and perhaps more flowers, to its owner than some other real greenhouses on a much more elaborate scale. Besides the flowers, the glass house is big enough to hold comfortably a wicker armchair and a teastand. The house is built on one corner of the porch, and gets the early morning sun from the east, and the south and west sun later in the day.

The first year a small coal stove was installed in one corner, and the temperature varied from tropical to arctic in a startling

manner; but in spite of being baked one hour and chilled the next, the plants managed to survive. The coal stove was succeeded by a smokeless oil heater, which has proved, except in windy and very cold weather, a most satisfactory arrangement. The heating question was finally settled for good by running a pipe from the furnace underneath the drawing room out into the glass house.

The glass house was first furnished with some stocks and cannas taken from the garden, and some ferns and green-leaved plants. Just a few days before Christmas the first box of paper-white narcissus is in full bloom, and since then the house is not without a flower. Freesias, Chinese sacred lilies, and more paper white narcissus follow in January, and about the middle of the month the azaleas commence and keep bravely on until the last of March. Before the flowers of the last box of narcissus wither, the early Yellow Prince tulip starts in, about the 15th of February, lasting till near the end of March.

One hundred and fifty *Gladiolus Colvillei*, planted early in January, gave dozens of white and pink flowers in the third week

of May. Wisterias in large pots, and hyacinths came next, while more tulips (variety Murillo) and a huge plant of double flowering cherry (*Prunus Pseudo-Cerasus*, var. *hortensis flore-pleno*, known in the trade as *P. Sieboldii*, var. *rubra plena*) made March gay with pink tints. The calla lilies flower until May.

In such a place as this seeds of the greenhouse type of plant, such as primrose, cineraria, and calceolaria, may be started in the usual way, in flats with window glass over the boxes to prevent too rapid evaporation of the moisture, but care must be taken to secure the right soil. Finely sifted woods earth, mixed with one-third sandy loam, has proved a reliable combination in the hands of the lady who presides over the house, in which to germinate the seeds of these plants. Drainage is provided by a layer of sharp sand and bits of broken crockery and charcoal in the bottom of the box.

When the seedlings have developed three or four leaves, they are transplanted to one and one-half inch pots, using about the same soil and drainage as in the flats, adding a small quantity of well-rotted cow manure.

The pots are now plunged to the rims in sand to keep the soil moist.

As it may be of practical value to others I give, in Chapter XVII., the "calendar of operations" for this piazza house. It's valuable because it is real experience, not a table of guesses.

BUILDING ROUND A CELLAR DOOR

Another triumphant solution of a somewhat similar problem of making a plant-house attachment to the dwelling resulted in utilizing the heat from the furnace and making a removable house around the cellar door. The story is best told by the one who did it all:

"The south door opens upon a small porch, with the outside cellar door under part of its roof. One French window also opens upon it. The floor of this porch was directly on the ground, and, as the boards had rotted away, we removed them, substituting a floor of cement.

"The cellar is low, and a modern furnace heated it beyond the point of wisdom. We sought an outlet for the heat and immediately the conservatory shaped itself. By

enclosing the small porch in glass and removing the outside cellar doors, the heat from the cellar would be released and the conservatory warmed. By leaving the hall door open and removing the French windows from the living room, we gained more heat and better ventilation.

"Our desire was to have as much glass and as little wood as was possible for strength and durability. We also desired the glass panes to butt and not be puttied. It was necessary to have a door in front of the cellar door for the removal of coal ashes, and transoms for ventilation. With this general plan the work was begun. A heavy timber was run along the floor and bolted at the corners (the conservatory must disappear in summer time). A corresponding timber ran along the edge of the porch ceiling. Uprights were then placed at certain intervals, and these were grooved to admit of the glass sliding down them. Photographic plates, 11 x 14, freed from the gelatine, made the glass panes for our conservatory.

"Curtains of unbleached muslin were arranged for; the rollers, four and five

feet long respectively, were of tin. These were set at the bottom, along the beam, and the curtains drawn up by means of a sash cord and pulleys.

"Two trays about table height were constructed. They were four inches deep, to admit of sand in them in which to sink the pots. A shelf was made about two inches from the floor on these tray tables, and formed an admirable place for seed boxes and for starting bulbs.

"The curtains proving insufficient protection from the sun, we coated the outside of the structure with a lime wash to keep off the direct rays. As for the heating, there was ample, and our cellar was kept in the finest condition. When the thermometer registered 4 below zero out of doors, the glass or garden room registered 56 degrees.

"The cost of this structure (before the World War) was:

Labour	$31.00
Lumber	16.42
Corner iron work	1.00
Hardware	4.00
Door	3.50
Sash cord	.35
Total	$56.27

"The labour included cutting the glass and placing it in the frames where it was needed."

THE HEATING PROBLEM

Perhaps, after all, the greatest stumbling-block in window gardening lies in the matter of heating. Very naturally one wants to have, as the fruits of this hobby, plants in flower during the winter season. The most ingenious method I ever heard of was the construction of a miniature gas furnace in the cellar to heat a portable window extension box, and it was by no means expensive. The scheme was evolved out of the desire to force bulbs; it came as an inspiration one October day when overhauling the storm windows preparatory for winter. Two tall, narrow ones which had been made useless by remodeling the sitting-room suggested the thought that here was a start toward the little conservatory. They were of exactly the same height as the storm sash of the south dining-room window. Here, then, were three sides of a window greenhouse; moreover, they exactly fitted each other and the window.

By means of four long screws on a side,

the two narrow sashes were fastened to the window frame at the exact places where the vertical edges of the regular storm sash belonged — only they were at right angles to the wall of the house, projecting into space. The regular storm sash was now screwed to the outer edges of the two sashes already in place, forming a generous space, ideally lighted, requiring only a top and bottom to make a splendid window-conservatory.

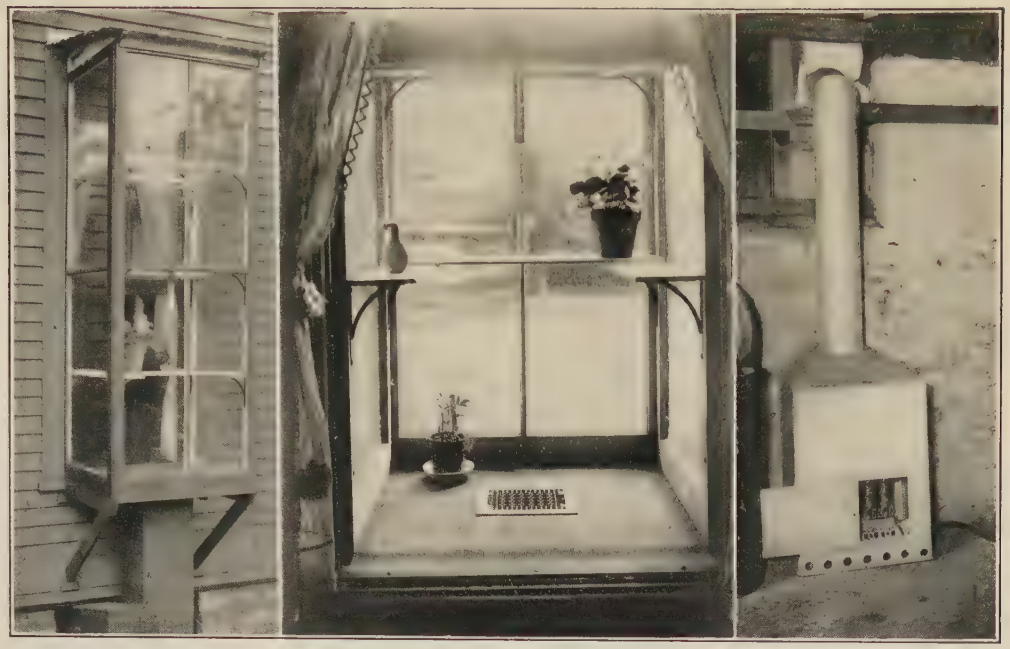
Half-inch boards nailed across formed the bottom and two oak brackets supported the whole. Two tapering boards were fitted to the top making a roof with a pitch and overhanging eaves sufficient to shed any kind of weather. Old rubber floor matting tacked over all made the top and bottom waterproof. A tight joint with the house was made by continuing the rubber back and up under the bottom of the first clapboard.

Three six-inch shelves were placed across both side sashes by means of five-inch brackets. When still more room was necessary, additional six-inch shelves were laid across the front with their ends resting on

the first set. This provided three complete tiers of shelves running around the three sides of the conservatory. Without crowding, about seventy-five pots and pans of various sizes can be accommodated here. As zero weather approached, the warmth from the dining room proved inadequate and other means of maintaining the requisite temperature to keep the plants growing were found to be necessary, so a miniature furnace was installed.

A three-eighth-inch pipe was run from the natural gas main in the cellar through the cellar window and up through the bottom of the conservatory, ending in an ordinary gas burner. This gave plenty of heat but the fumes from the gas proved objectionable and the arrangement was abandoned for the following which works admirably.

For $2.25 a tiny gas stove was purchased. This was placed on the cellar floor directly below the cellar window under the conservatory. A short smoke-pipe was connected to the nearest chimney opening in order to dispose of the fumes. A tinsmith made a galvanized iron hood which fitted down over and completely enclosed the stove; it



HEATING A WINDOW GARDEN

The details are given in Chapter I. By means of the miniature heater in the cellar a constant supply of warm, fresh air is delivered to the plants, which flourish all winter

AN UNHEATED WINDOW GARDEN

This collection of plants was grown entirely by the heat received from the living room, and it gave a welcome greenery all the winter

had a number of one-inch holes along its bottom edges for circulation, and a sliding door for access to the stove. Its top was drawn up to form a collar about eight inches in diameter. From this collar an eight-inch flue ran up and out through the cellar window (from which a pane had been removed), and ended at a five by seven inch register set into the floor of the "conservatory." The flue was enclosed in a wooden box or outer flue for insulation throughout its entire length outdoors.

This formed virtually a miniature hot-air furnace. The tiniest flame warmed the stove, which in turn warmed the air enclosed in the galvanized hood. This warm air flowed up the pipe through the register and gave the plants just what they needed — pure, moist, warm air.

HEATING FROM THE LIVING ROOM

But it may not be possible always to instal a carefully designed heating plant, and many are the cases where satisfactory window gardens are maintained by the heat from the adjoining room alone — no extra apparatus — but of course no real forcing is done

here. In one such simple garden, situated on the south side of the house, it is found by experience that the best results could be obtained by watering the plants frequently and keeping the adjoining library at an even temperature of 70 degrees.

About the 1st of October every year the window garden is filled with chrysanthemums, of which it holds about four dozen. These flowers last till the end of November, when they are replaced by the real winter flowers, first among which are the geraniums, which are hardy and do not require much care and will remain in flower throughout the winter. Heliotropes also do very well. Candytuft in boxes does much better than if placed singly in pots, and makes a better showing. Nasturtiums with plenty of room and strings to climb on will remain in flower all winter. Mignonette and begonias can also be grown to advantage, and do not require much care. In fact, any flower of a hardy nature will flourish in one of these gardens.

CONTROL OF TEMPERATURE

Never let the cold, frosty air strike your plants, for it will kill them; nor let the

temperature of the room vary between too wide limits (20 degrees would be safe, but extreme during the day; the night temperature can be as much as 10 degrees below the day minimum). If at one time the plants are overheated, and the next moment chilled, their growth is stunted and their bloom killed.

CHAPTER II

Making the Soil Foundation

The ideal and practical substitutes — Loam and when to get it — The compost heap — Spring *vs.* fall making — Manures of various kinds — Leafmould — Peat — Muck.

Good soil is an absolute necessity to success with plants and there is only one way to get it — by mixing. A workable soil may be made from loam, sand, and manure, but it will be much better if it has an addition of leafmould, peat, or well-weathered muck.

When it is impracticable to make a compost heap, any good garden loam may be used and it is not absolutely necessary to prepare it any length of time beforehand.

PASTURE LOAM FOR COMPOST

The best loam to use in a potting soil is well decayed sod taken from a pasture. The best time to secure it is in the fall after the grass has been killed by hard frosts; it can,

however, be secured in the spring before the grass starts to grow. Cut the sod three or four inches deep and place it in a pile, the grass side down. For convenience make the pile about four feet wide and high, and as long as necessary, and have the top hollowed out a little so that it will catch the rains and so keep the pile moist. Many people when making up the sod pile compost manure with it. If you prefer to do it this way add one part fresh cow manure to each three parts of sod, if done in the fall.

ADDING MANURE

When the compost is made in the spring the manure must be well-rotted, and horse manure is preferable to cow manure.

The compost pile must be thoroughly mixed two or three times by chopping it down with a spade and throwing it up into a new pile.

A spring-made compost heap will be ready to use in the fall, but the soil is apt to be rather coarse. The fall-made compost is sure to give much better satisfaction.

In my practice I have always found well-decayed horse manure better than cow

manure; the latter can be used, however, but it tends to make the soil cold and clammy. Well-decayed horse manure may usually be purchased in the suburbs and smaller towns from the livery or other stables. If you cannot purchase rotted horse manure and you have a convenient place in any out-of-the-way corner in the backyard where fresh droppings can be stored, well and good. They will require several months to rot properly. Protect it from the rain and turn it over frequently to prevent burning. If the manure gets too dry sprinkle it with water when turning.

Sheep, hen, pigeon, and other manures may be used in mixing potting soils, but very sparingly, for they are so strong that if a large amount is used the roots of the plants will be burned.

LEAFMOULD, PEAT, AND MUCK

Added to the potting soil, either leafmould, peat or muck makes it much more friable, increases its water-holding capacity, eases the circulation of the air through it, and induces a better growth of roots. In no case is there actual fertilizing value. In raising

from seed such plants as cyclamens, cinerarias, Chinese primroses and begonias, leafmould is a necessity. Where manure is not obtainable one of these three forms of vegetable mould must be used to supply the necessary humus; the plant food can then be added in the form of a complete fertilizer which may be bought from any seedsman.

Peat is very scarce in this country, and so is quite expensive; but it can be bought from nearly all the dealers in seeds or bulbs.

Leafmould and muck are much easier to obtain, and usually cost nothing outside of the labour necessary to collect them. When the foliage is falling, late in September or in October, is the best time to lay in a stock of next year's leafmould.

If there is no hardwood timber land nearby, where you can get clean leaves, then rake up the leaves which have fallen in the street. Maple leaves are best, but those of the elm and oak will do. Sometimes an arrangement can be made with the city employees to dump in the back yard all the leaves they gather in cleaning the streets. In this way, and at no cost,

an abundant supply of leafmould can be had in suburban districts.

HANDLING LEAVES

In the winter the leaves may be used for banking coldframes and pits, to keep out the frost, or for mulching the bulb beds. In the spring, when the pits are empty, throw all the leaves into a pit, wet them thoroughly, and allow them to rot. By fall they are in good condition to use. If this way of rotting them is followed, you will probably need to wet them several times during the summer. Another good way to handle the leaves is to dig as large a hole in the ground as you can fill with leaves. Pack in the leaves as tightly as possible, wetting them as they are being thrown in. A good time to do this is on a rainy day, for then it saves the necessity of handling water. If you have a hose you can do the work at any time.

If neither of these ways can be followed the leaves may be put in a heap on the ground, thoroughly moistened, and tramped down. When treated thus, it will be necessary to water them oftener, because the pile presents

more surface from which the moisture can evaporate. Turn the heap of leaves occasionally, and in two years the leaf-mould will be in usable condition.

Never bury leaves in your garden where you intend to grow plants next year. The heat caused by the fermentation will injure the roots of the growing plants.

VALUE OF MUCK

Muck from either a fresh water or salt water marsh is equally good as leafmould, but it must be dug at least one winter before using. After digging, place it on the upland, away from the tides and floods, in triangular-shaped piles about three feet wide, three feet high, and as long as necessary. By putting it in such small piles the frost and air have a much better chance to work through it than if it is in larger piles. Under ordinary circumstances, exposure to the weather for one winter will sweeten it. But if not, add a little lime; this will quickly neutralize any acidity.

DRAINAGE

One of the most important things to provide for in a soil is drainage. This is best

secured by adding sand. Use a clean, sharp sand such as a mason would use for making mortar. If you cannot secure this from a nearby sand bank, you can buy bird sand, if only small quantities are needed, from the grocer. It comes put up in small packages. If sand from the seashore is used, get it from the shore side of the sand hills, and wash it thoroughly before using in order to remove any salt. Although I have never done it myself, I have seen coal ashes successfully used as a substitute for sand. They were, of course, screened to remove the coarse matter. On heavy soils coal ashes sometimes are a positive detriment, however, by making the clay into a sort of cement. Where better drainage is wanted than can be given by simply adding sand, add charcoal. If the plants are to stay for a year or so in single pots without repotting (as is the case with palms), the charcoal is a distinct advantage, not only because of the better drainage it affords, but also because it prevents the soil from souring. Charcoal is cheap, and a little of it goes a long way.

It is very important to have on hand

at all times the ingredients necessary to make up a good potting soil, so in an outbuilding away from the weather, or in the cellar, have bins in which a six months' (if not a year's) supply, of the articles just mentioned may be stored. You will find this a very decided advantage, especially in the winter when the ground is frozen. Even the manure may be stored in the cellar, if it is well decayed, without the least inconvenience.

No hard and fast rule can be laid down for the amounts of the different ingredients of a potting soil. They will vary with the character of the soil in your locality. I have found that a soil composed of equal parts of rotted sod, manure, leafmould, and sand will give excellent results with plants ordinarily grown in the house. If the rotted sod has been composted then it will be necessary to add only sand and leafmould.

Mix the soil thoroughly before planting. The best way to do this is to get the component parts together in layers, and then throwing the mass over to making a new pile. Always shovel from the bottom of

the pile, and always throw the added matter on the apex of the new pile so that the soil can roll down the sides. If this is done, and the pile turned three or four times, the soil will be thoroughly mixed.

Before mixing the soil determine whether it is sufficiently moist. This may be told by taking a handful of the soil and pressing it firmly in the hand. If water can be squeezed out the soil is too damp, and ought not to be worked over until enough dry soil has been added to take up the surplus moisture.

If, after having been pressed in the hand, the soil remains together, but will break upon being lightly touched, it contains the proper amount of moisture. If it will not remain in a lump but breaks up immediately the pressure is released, it needs more water. Add it by means of a watering pot; the amount necessary can be judged better from experience than by any rules which may be laid down.

REPOTTING

It is far better to gradually shift on a plant as it requires more space than to plant it into too large a pot at the beginning. The soil sours. The proper method of "knocking out" and of firming the soil are shown above

SOWING SEED AND TRANSPLANTING

Sow seed carefully in straight lines, using a shallow box of soil. The young plants must be lifted and put into individual pots when quite small

CHAPTER III

Potting and Repotting

When to repot — Why plants die — Feeding *vs.* shifting — Winter disturbance — "Knocking out" — Seedlings — Cuttings — The potting bench — Crocking and drainage — Danger of large pots.

The best time of the year to repot house plants is in the spring (April or May), or when new growths start. Only in very exceptional cases do house plants need repotting during the winter; this is particularly true of palms, ferns, rubber plants, etc. These plants are then resting or are making very little growth, and meddling is positively dangerous to their lives. The average amateur gardener does not realize this, and, although the plant is in a good, healthy condition, he becomes very much worried because it is not making new growth. Then he will repot the plant, putting it in a larger pot, and nine times out of ten the plant becomes sickly and often dies in a few weeks because of the shock received and the

inability to make a new root system rapidly, and so take hold of the new soil.

FEEDING *vs.* REPOTTING

Soft-wooded plants, like geraniums and coleus, I would much rather feed with liquid fertilizer than repot during the winter; although, if the plants are growing, they may be shifted to slightly larger pots without injury. Should you desire to repot the plants, do so before the roots circling about the inside of the pot become woody; after they have matted but while still white and succulent.

HOW TO "KNOCK OUT"

To remove the plant from its pot, take the pot in the right hand and place the stem of the plant between the index and middle fingers of the left hand; then invert it and strike the edge of the pot sharply against the edge of the bench. The ball of earth and roots will slide out easily, unless the earth is dry; in that case, before attempting to remove the plant, immerse it in water until the earth has become damp.

Now, with the right hand, disentangle and

spread out the lower half of the mass of roots. If part of the ball of earth crumbles away, it does not matter. Then place enough soil in the new pot to bring the plant in about the right position — that is, with the surface (which should be loosened up) of the old ball about half an inch to one inch, according to size, below the rim of the pot.

The potting stick (see page 32) will be useful in firming the soil.

When removing palms, rubber plants, and other comparatively large-rooted plants from the pots, the roots will be found matted together in circles. If possible, without injuring the roots, remove the old drainage. This will leave a large hole in the ball. Before putting the plant in the new pot, fill up this hole with soil; otherwise it will allow the water to drain away too rapidly, and the interior of the ball becomes too dry. Sometimes the roots are so matted that it is impossible to remove the drainage.

POTTING UP CUTTINGS AND SMALL PLANTS

Cuttings and seedlings are usually first potted up in thumb pots (two-inch), from which they are shifted to larger pots as soon

as the pots have become filled with roots. The soil used in filling these small pots must be free from all lumps. The better way to pot these small plants is to hold the cutting with the left hand and with the right hand fill in the soil. When the pot is full, firm the soil with the thumbs and then give the pot a sharp rap on the bench to settle the soil.

Another way to pot up cuttings (but which I believe is not so good as the way already described, because the roots are much more liable to get bunched together) is to fill the pots with soil and then make a hole in the soil for the roots, after which the soil is firmed. This is also a slower method.

LIFTING IN LATE FALL

When potting plants in the fall which have been outdoors in the flower beds all summer, select only stocky, healthy plants.

Dig them carefully so as to secure as many roots as possible. If the soil is clayey, it must be neither so wet that it is muddy and the roots cling together, nor so dry that the dirt crumbles entirely away from them. The right condition of soil can be

obtained by a thorough watering at least five hours before potting.

If the plants are growing in sandy soil, it is better to have it rather dry, for then more of the working roots can be saved than if it is wet.

After potting thoroughly water the plants and set them in a shaded place. Syringe the foliage several times a day until the roots have taken hold of the new soil; but under ordinary conditions, the soil will not again need watering until the new roots have been made. As soon as the plants have taken hold, gradually inure them to direct sunlight.

MAKING WORK EASY

Potting is done best on a bench which is about waist high. For the window garden a portable affair will be found the most satisfactory. An old kitchen table on three sides of which some boards, about a foot wide, have been fastened to keep the soil from falling upon the floor will serve the purpose.

The best way to work the soil in among the roots is to hold the plant with the left hand, put a little soil around the roots, and work the plant up and down a little. Put in

some more soil, and tamp it down with a potting stick. It is possible to get the soil too firm, so use the potting stick with moderation, and be careful not to strike the roots.

A potting stick is usually made from a piece of pine about a foot long, an inch wide, and an inch thick, with the corners and ends rounded off. A piece of a broom handle is sometimes used.

If the soil contains many lumps or coarse pieces of sod (as sometimes happens when the sod is not completely rotted), screen them out before potting. This will be necessary if the pots are small — six-inch and smaller — with larger pots it will make but little difference. The ordinary ash sieve is just the thing for this. Or you can make a sieve from a small box, say about eighteen inches square, cut off at a depth of three inches, and the bottom covered in with wire screen netting which has a quarter-inch or three-eighth-inch mesh, and sift the dirt through this. Save the coarse material, it will be useful when potting.

In the bottom of each pot put some coarse drainage. Broken pots are usually used for this, but coal clinkers or stones are just

as good. Use whichever is the handiest. Broken charcoal is very good also. The larger sizes of pots — three-inch and up — need crocking; use from a quarter of an inch to two inches of drainage according to the size of the pot. If you use broken pots, put the pieces in with the convex side up; the crocks will fit better. Over this drainage put some of the coarse screenings to keep the finer soil from washing down through. If there are no coarse screenings, use sphagnum moss.

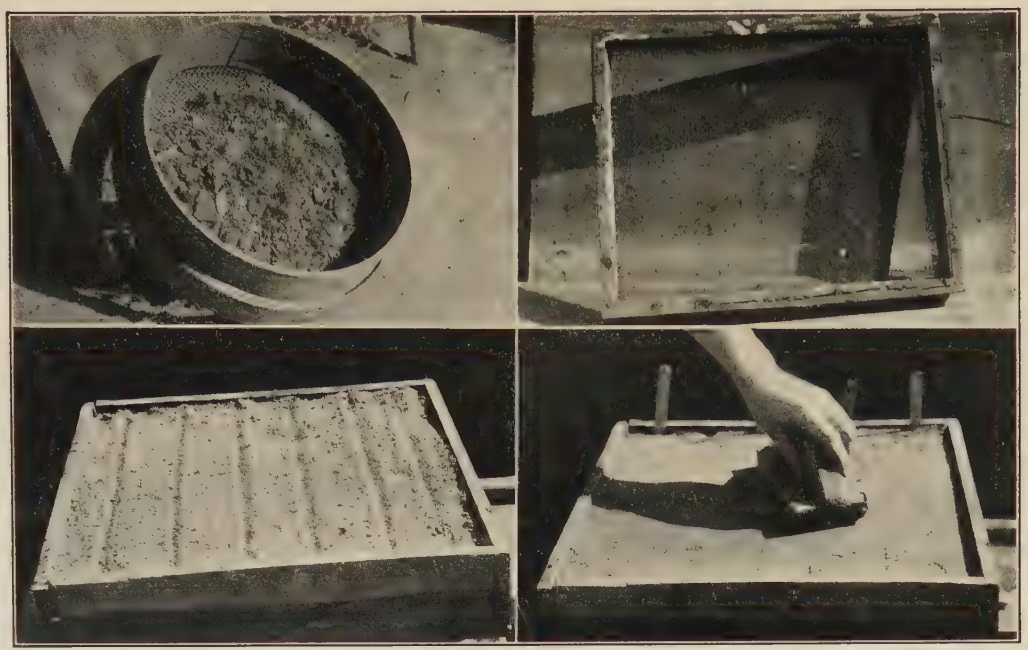
THE FALLACY OF LARGE POTS

Don't work on the principle that the larger the pot and the more soil, the thriftier the plant. It is not the amount of food available, but the amount assimilated, that counts. As a rule, any pot which seems to be in proportion to the plant, holding soil enough to keep it from being top-heavy, will be sufficiently large. Most amateurs make a mistake in the size of the pot, using one a size or two too large. It is very easy, indeed, to over-pot a plant, strange as it may seem, and really nothing in the plant's life can be more disastrous than an overlarge pot. Nine times out of ten the

plants will be over-watered and the soil become sour.

Pots may be obtained at almost any hardware store. Buy the heavier ones, as the very thin ones now manufactured by some firms dry out too quickly. Soak new pots in water until they get through "bubbling"; otherwise, the soil of the newly potted plants will dry out too quickly. If the pots are old and green with algæ, clean them by scrubbing them with sand and water, for the "green" makes them less porous, and old earth dried on the inside surface interferes with the new root-growth.

If potting is to be done with soil which has been mixed for some time, determine by the method described in the previous chapter whether or not it has sufficient moisture. If it has not, spread the soil out thinly on the bench, water it, and then turn it a couple of times to evenly distribute the moisture as directed on page 26.



HOW TO SOW SEEDS

Have a sieve for screening the soil and use only the fine material for the seed bed. Carefully mark shallow drills in which the seed is to be sown, and after sowing press down firmly with a wooden block. Sow several kinds in one flat

THE BEST OF THE PRIMROSES

Primula obconica may be had in flower pretty nearly all the year, and by selecting the best plants for seed, specimens like this may be grown easily

CHAPTER IV

Raising Plants from Seeds

The seed soil — Flats *vs.* pots — Sowing the seeds — Depth to cover — Watering — Pricking out the young plants — Transplanting — Possibilities of the window garden — Most easily grown plants.

Many of the best house plants can be raised from seed in the ordinary living rooms, or where potted plants are grown in a window during winter. It is a question whether you actually save anything by raising your own plants; in all probability you could get them as cheaply and as good, if not better, from the florist, but there is no question about the fun in growing plants from the seed. There is a satisfaction in having things all your own, and the work offers engagement indoors at a time when gardening work outdoors is slack.

Home made "flats"

Where only a few plants are to be started, unglazed pots or seed-pans are often used,

but "flats" are cheaper. To make these buy from a grocery store some soap boxes. A convenient size is twelve by fifteen inches. Cut them into three-inch sections and nail bottoms on these, taking care to leave cracks between the boards or make four or five one-inch holes for drainage. The sides may be painted, if they are to be used in the house. These flats are better than pots both for starting the seed and pricking off, as they save care in watering, room, time, and trouble and the moisture in the soil is much more constant than in a small pot.

The flats being ready mix the soil. A good seed soil is made from equal parts (1) fibrous loam from the compost heap, (2) sand, and (3) leafmould, woods earth, or peat.

Over the holes or cracks in the flats put a one-half-inch layer of broken potsherds, coal clinkers, or gravel for drainage. Then put through a sieve part of the already mixed seed soil. You will then have two lots of soil, one coarse the other fine. Spread a one-half-inch layer of the coarse material over the drainage material that is already

in the flat and on top of that fill the flat to within half an inch of the top with the fine, screened soil. Pack the soil in the corners and along the edges with your hands, because if you do not, it will settle there more than in the middle, and the waterings will wash down the soil, uncovering and often taking the seed with it. Firm the whole by means of a damp brick or board.

SOWING THE SEED

Make drills about two inches apart using a piece of narrow board as a marker, merely pressing it lightly into the soil for a quarter-inch or so. Sow the seeds thinly and evenly in the drills, and cover lightly; the best way to cover the seeds is to screen the soil on them, using a screen which has a mesh about the size of that in mosquito netting. A good rule to follow when covering seeds is to put on a layer of soil which is as deep as the diameter of the seeds. Sand, dry sphagnum, cocoanut fibre, or leafmould which has been rubbed through a fine screen, make very good coverings for seeds. They never get hard or bake, making an ideal covering — light, easily pushed through

by the tender seed-shoots, and retentive of moisture.

Water the soil thoroughly after sowing. The best way is to set the flat in a large pan partly filled with water, allowing it to soak up from below. This is better than overhead watering because no matter how fine a spray is used it is liable to wash the soil. Another way is to water through a sheet of blotting paper. Place the blotting paper on top of the seed bed and slowly apply the water, allowing it to soak through the paper. The drip is thus avoided.

Cover the box with a loose-fitting pane of glass to keep a more humid atmosphere, thus reducing evaporation from the soil. Every day remove the glass and wipe off any water of condensation which may be on it. Place the flat in a position where it will receive all the light possible, but shade it from the direct sunlight.

THE DETAIL OF "PRICKING OUT"

Pricking out is the first transplanting of the seedlings, and needs to be done tenderly. As a rule as soon as the seedlings have made

their first two real leaves it is time to "prick out" into other flats, prepared similarly to the seed flat.

Do not try to take each single seedling from the seedbed. Take out a portion of soil which has a number of seedlings in it, lay it on its side and gently separate the soil.

The dibble is a very useful tool for this purpose. It is made from a small piece of wood one-fourth or three-eighths of an inch square, or round, and about four inches long. Make a tapering point — two inches long — on one end; the other should be drawn down to an edge. This latter will be very useful in separating the plants and firming the soil about the seedling when it has been set in the new soil.

Put the little plants in rows an inch or two apart, water thoroughly, and shade for several days from hot sun with newspapers. Do not water again until the surface of the soil begins to dry. Do not delay the pricking off, do it just as soon as the little seedlings can be handled, for they may all be lost by "damping off," or they may become drawn. Should the seedlings begin to damp off

apply some hot sand, sprinkling it on with a fine-meshed sieve.

As soon as the plants need still more room prick them out singly into thumb (two-inch) pots. When transplanting insert the plantlet a little deeper than it was in the old bed.

THE FATAL FROST

All the plants named later in this chapter can be grown in an ordinary window, where ordinary living room conditions prevail. The temperature should be from 50 degrees to 55 degrees at night, and under no circumstances must the freezing point be reached. The day temperature, if you can control it, may be allowed to rise 10 degrees on dull days and 15 degrees or 20 degrees will do no harm when the sun shines.

RED BERRIES FOR CHRISTMAS

Nothing is easier for the owner of a sunny window than to grow a few plants of the Jerusalem cherry (*Solanum Pseudo-Capsicum*), as the spare room is needed only when the weather gets warm outside. I don't know of a more generally satisfactory Christmas plant either. It is symmetrical, full of

bright red berries, and may easily be had with a head a foot in diameter for the holidays from seeds sown during winter or spring. The "cherries" hang on for three months but in a gas laden atmosphere the leaves soon drop off.

Sow the seeds in February, and as the plants fill their pots with roots, shift to a slightly larger pot.

During summer, plunge them in a partially shady place outdoors, and give plenty of water. By pinching back, and turning, the plants may be kept symmetrical. When taken into the house in the fall, see that they get plenty of air and plenty of water at the roots, and syringe the foliage. Be careful about watering while the fruit is setting and ripening. To carry the plants over from one year to the next, cut back the old plants in the spring, and give the same treatment as they had the previous summer.

A PLANT FOR BASKETS

The best decorative plant for shelves, baskets, or hanging baskets is the foliage asparagus (*A. Sprengeri*). Its foliage is much coarser than that of the fine-leaved

asparagus (*A. plumosus*), somewhat resembling light, glossy-green pine-needles, stuck endwise upon viney stems. But its branches hang down gracefully on all sides, and make a handsome, symmetrical plant. If kept growing freely all summer the plant will produce an abundance of red berries about Christmas time, making a welcome addition at that season.

VINES THAT FLOWER ALL WINTER

I think no plants are more artistic, more beautiful for room decoration than the climbing vines. The fact that they are so seldom used for this purpose gives them an added distinction. For myself, I prefer the ivies, on account of their simple strength and grace; and they are best got at the florist's. But several good house vines are best raised from seed. The cup-and-saucer-flower (*Cobœa scandens*), and *Thunbergia alata*, with its varieties, are the best two flowering vines for the house. The former has purple, bell-shaped flowers, two inches across, the latter having, according to the variety, blooms of golden yellow, rich orange, white and blue, or pure white, with white or dark

centres, and about one and one-half inches across. Both these plants are perennials, but are often grown as annuals. They are easily raised from seed, are strong, rapid growers, and have very decorative foliage.

If seeds are sown early in the year — January or February — the plants can be used outdoors during the summer, and in September may be cut back, dug up, and potted for the window garden. By making successive sowings once a month until the end of May, the Thunbergia may be had in bloom all winter. The Cobœa seeds must always be set edgewise in the ground.

Two other vines which will give lots of pleasure if you have a sunny window are nasturtiums and morning-glory. I have seen morning-glory make a growth of six or seven feet when grown in an ordinary cigar box. The flowers and foliage were not as large as they would have been if grown outdoors, still the plants were healthy and flowered freely, affording much pleasure to the grower.

The nasturtium will produce a wealth of red and yellow flowers, but it absolutely demands an abundance of sunlight; if you

cannot grow it in a south window where it will receive direct rays from the sun for the greater part of the day, flowers need not be expected. Seeds sown in July or August in two-inch pots, from which they are shifted to four-inch, and later to six-inch pots, will flower some time about Thanksgiving or Christmas, and will continue flowering the rest of the winter. A six-inch pot is sufficiently large for one plant, but very pretty effects can be made by growing six or seven plants in a larger pot, say nine- or ten-inch and training them over a trellis.

VINES GROWN FOR FOLIAGE

The smilax of the florists (*Asparagus medeoloides*, also known as *Myrsiphyllum asparagoides*) is also one of the best vines for the amateur's window garden. Planted in boxes, it can be trained to the window cases. The shaded places in the window garden are admirably adapted to its necessities, so it can be used where other green plants refuse to grow. The plant will make a growth ten feet long, and must have a string to climb upon. The foliage is a dark, glossy green, and there are single white

flowers in winter, which are very fragrant. The seeds must be sown in January or February, and when the young plants are two or three inches high, and are making their characteristic leaves, transplant them singly to two-inch pots. In May they will need shifting to three-inch pots.

July is the time when the florists plant them out in beds in the greenhouse, but in the window garden, where a bed is not possible, I use a long, narrow box, six inches wide, as much deep, and two feet long. In this five plants are set. This is a little closer than the florists plant them, but as I have only a single row, it gives them plenty of room for development. The soil should be very rich — a fibrous loam, to which is added half-rotted cow manure and sand, one part each to three parts of loam.

The strings must be arranged just as soon as the seedlings are planted. The best material for this, because of its strength and colour, is the green smilax string used by florists, from whom it may be bought. Should you desire to use the smilax for festooning elsewhere about the house, the strings with the

twining vine may be cut, and the roots will immediately start a new growth of stem. Make a new sowing of seed each year, as it does not pay to hold the plants over from one year to another. They need a night temperature of 50 degrees to 65 degrees.

ASPARAGUS THIRTY FEET HIGH

The most popular of the so-called asparagus ferns, *A. plumosus*, var. *nanus*, may be trained in vine form, too. I have seen this "dwarf" growing to the height of thirty or forty feet, with great stems like tangled creepers in a jungle. This is the best variety, because it can be used for short sprays, as a decorative pot plant, or as a vine. There is no foliage more beautiful than the delicate, light green, feathery sprays of this asparagus, and yet, in spite of its fairy-lace appearance, when cut it keeps both its colour and freshness for a very long time.

This plant is a slow grower, and it is important to have fresh seed. Sow in a good, light seed soil — *i. e.*, one having plenty of leafmould and sand in it. When the young plants begin to make good root growth, transplant to three or four inch pots. This

size pot will be sufficiently large for the plants all next winter. If the growth is too long and straggly, pinch back, as is necessary. In the summer time you must decide how you wish to grow the plants — as dwarfs, or as vines.

To grow a handsome pot plant which can be used for decoration anywhere in the house, shift the young plants to a five or six inch pot, and use a good, rich, but well-drained soil. When the new growths are a foot or so long pinch out the ends. This will keep the plant dwarfed and shapely.

To grow as a vine, plant in boxes just like smilax, and be very particular that the soil and boxes are well drained.

The seeds of this asparagus are expensive, because it does not fruit freely.

IN FLOWER ALL THE YEAR

Of course you will want flowers, as well as green foliage. Perhaps the very best all-purpose flowering plant is *Primula obconica*, var. *grandiflora*, which is not tender, and blooms the whole twelve months. It is the most graceful of all primroses. Its large, single flowers are borne in clusters on the

tops of stems which are four to ten inches high, and their pale, white cheeks just tinged with blue or blushed with rose. In well-grown specimens the individual flowers are often an inch and a half across. The leaves are almost round, sometimes four inches in diameter, borne on long stems, and forming a rosette supporting the flower stalks. The hairs on the leaves are irritating or poisonous to some people, which accounts to some extent for the plant not being more popular. Certainly it will grow in a more varied range of temperature, and flower longer than any other house plant.

Sow the seed any time from January to March. It may be sown later, but unless you have a coldframe in which to shade the seedlings, the young plants will be more difficult to manage. By May the seedlings should be ready for thumb-pots. A few days after potting, give abundance of air — though keep shaded — and never allow them to get dry. Syringe them on bright mornings, and after the middle of September keep the temperature about 50 degrees at night. In potting and repotting — they will require several shifts — take care not to press in too

firmly about the roots, and not to cover the crowns of the plants.

FLOWERS FOR FRAGRANCE

The one plant which will give the greatest amount of satisfaction on more distinct counts than any other in the window is the cherry pie (*Heliotropium Peruvianum*). The beautiful purple colour of the flowers combined with the sweet, spicy perfume (whence its English name) and the long period of bloom, combine to make this an ideal window garden plant.

Originally the heliotrope flowers were violet coloured and borne in trusses about two inches across, but now, after much improvement by breeding, they are also to be found in several shades of purple and even white, and the individual trusses six inches across.

Grown in pots or boxes, a plant will ultimately cover a space about eighteen inches square, and attain a height of a foot or fifteen inches.

If you want to do something a little unusual, grow a few of the plants to a tree form. When handled this way four crops

of flowers can be had from one plant from May to October. Such plants are extremely useful for hall and porch decoration.

Sow the seeds at any time from February to May, and grow the plants in pots all summer, as the heliotrope objects to removal or any interference with its roots.

If the plants are kept in the dwelling house during the summer, give as cool and moist an atmosphere as possible, for though they like sunlight, too much dry heat will scorch both leaves and flowers. Pinch back the plants wanted for winter flowers so as to give them a stocky form and to prevent them from making flowers in the summer. If possible, plunge them outside in the flower border, turning them once in a while to prevent their rooting through the hole in the bottom of the pot. Take them into the house upon the approach of cold weather. Plunging means setting the potted plant in the soil, up to the rim of the pot. This keeps the roots cool.

SUCCESS WITH MIGNONETTE

Measured by the fragrance alone I believe that the mignonette (*Reseda odorata*) is by

far the best window plant for home raising. The pyramidal flower heads are unattractive in colour, but they exhale a most delicious odour — there is nothing else just like it.

Mignonette is very hard to transplant; indeed it is impossible to do it without giving the plants a check, and the secret of growing good mignonette lies in growing it on without a check at any stage of its growth. For winter bloom sow the seeds in July, August, or September. July-sown seed will bloom in November. Instead of sowing in flats sow directly in pots.

Prepare as described for flats as many two-inch pots as you wish plants to grow. Make a slight depression in the soil in the centre of each and drop into it two or three seeds, covering lightly with soil. When the seed has germinated (about two weeks) thin to one plant to a pot, retaining the strongest. When the pot has become filled with roots shift to four-inch pots and as soon as these are full of roots shift to eight-inch pots. When giving this last shift put in a two-inch layer of drainage. Be very careful not to over-water or the soil will sour; but, on the other hand, mignonette must never get dry

— that would cause a check. For the same reason never allow the plants to become pot-bound.

When the plants get about four inches high, pinch out the centre of the middle shoot. Two or three new shoots will come out from the stem, and these, with the five or six which have developed, will make a well-shaped plant. Pinch out any other shoots which may start. When the plants get about six inches high, they will need staking. For this, use small, round stakes that will be inconspicuous — birch or willow twigs are excellent for this — putting one to each stem.

When the plants get about ten inches high, and before the flower heads show, pinch out the tops of the stems so as to induce all the shoots to flower at the same time. When the flower buds commence to show, give the plants weak manure water for about a week, if the pots are well filled with roots. As the buds develop, give it oftener — say about twice a week. If you have grown the mignonette carefully without a check, there is no reason why you should not have nice plants, bearing anywhere from a dozen to

fifteen good spikes. The mignonette is a cool-loving plant, and it is said that plants grown in a cool temperature will produce more fragrant flowers than those grown in a warm temperature.

I have never grown, nor have I seen, snapdragon (*Antirrhinum majus*) in the house, but I would not hesitate to try it. In a cool greenhouse it is almost as easy to grow as weeds. It can be had in beautiful spikes a foot long, and in white, yellow, and red.

For flowers the following winter, sow the seed in July, or early in August, and grow on the plants as rapidly as possible, shifting them from the two inch pots in which they are started to four inch, and, later, five or six inch, when they demand it.

THE LOVELY CYCLAMEN

No plant gives better satisfaction than the Persian cyclamen (*C. latifolium*). It is well worth trying in the window garden. Its flowers last a long time in good condition, and it has a wealth of colour. The flowers are very curiously shaped, reminding one of its relative the shooting star (Dodecatheon).

They are white or varying in different shades of pink to very dark rose colour, with a purple blotch at the mouth. There is a form the petals of which have fringed edges.

These are best grown from seed, and so constant are some of the strains that one can buy named forms which come true. The largest flowered form is called giganteum, but the large flowers are produced at the expense of quantity, so the amateur would better content himself with the good strain of a smaller flowered form. It takes fifteen months to grow the cyclamens from seed to flower, and they must never receive a check. When through flowering throw the bulbs away; they do not do well when held over.

For spring flowers the seeds are sown in November or December. These are slow to appear above ground because a little bulb is formed before the first leaf shows. As soon as two leaves have been made, transplant the seedlings to four or five inch pots, placing several in a pot, and putting them near the outside. These young seedlings are very apt to suffer from too much water and over-potting — when the plants have about half a dozen leaves shift them to

three inch pots. They will not need another shift until the middle of summer when I should put them into four inch pots. In September shift them to five or six inch pots, in which they will flower. The best soil is a good fibrous loam and leafmould, well-decayed horse manure, and sand in about equal parts.

Directions for raising cactus, etc., are given in the chapter specially devoted to that class of plants (see page 166).

Other plants which may be grown from seed successfully in the house are:

Flowering maple, *Abutilon striatum;* Floss flower, *Ageratum Mexicanum;* Amethyst, *Browallia demissa* (*elata*); Chimney bell flower, *Campanula pyramidalis;* Cigar plant, *Cuphea platycentra;* Trumpet flower, *Datura cornucopia;* Dragon plant, *Dracæna indivisa;* Balsam, *Impatiens Balsamina;* Cypress vine, *Ipomæa Quamoclit;* Mina, *Ipomæa versicolor* (*Mina lobata*); Lemon verbena, *Lippia citriodora;* Ice plant, *Mesembryanthemum crystallinum;* Wax plant, *Mesembryanthemum tricolor.* Another wax plant, *Hoya carnosa,* is propagated by division or by cuttings. Fig marigold,

Mesembryanthemum cordifolium, var. *variegatum;* Musk plant, *Mimulus moschatus;* Flowering tobacco, *Nicotiana affinis; Nicotiana sylvestris*, *Nicotiana Sanderæ;* Oxlip, *Primula elatior;* Chinese primrose, *Primula Sinensis;* Baby primrose, *Primula Forbesi;* Scarlet sage, *Salvia splendens;* Wishbone plant, *Torenia Fournieri;* Canary-bird vine, *Tropæolum Canariense;* Madagascar periwinkle, *Vinca rosea;* White periwinkle, *Vinca rosea*, var. *alba;* Pansy, *Viola tricolor.*

CHAPTER V

Propagation by Cuttings, Etc.

The sand bed — Temperature — A home-made propagating box — Making a cutting — Propagating from leaves, roots, and offsets — Geraniums — Dracænas — Umbrella plant — Making new rubber plants.

It is easy, indeed, to grow from seeds such plants as are described in the preceding chapter; but this is impossible with the named varieties of fuchsias, geraniums, and such like. Then, again, seeds of such things as rubber plant and screw pine are seldom offered for sale. Therefore, one must resort to some other means of propagation.

Cuttings or slips, made from pieces of the stem or root or leaf, are generally used. Sometimes, however, increase is by some form of division of the roots; each plant has its own particular method. But most of the plants which may be grown easily in the house, and which are not

grown from seed, may be grown from cuttings of the stem.

THE SAND BED

The best medium in which to root cuttings is damp sand. An ordinary soap box, cut down so as to be about six inches deep, will furnish sufficient space to root all the cuttings necessary to supply any ordinary window garden. In the bottom bore five or six one-inch holes, and put a layer about an inch deep of broken pots, gravel, or broken up coal clinkers for drainage. Over this put a little sphagnum moss to keep the sand from sifting down through the drainage; then put in a three or four inch layer of sand; moisten and pack it down with a brick. Have it perfectly level. The bed is now ready for the cuttings.

One drawback to the home propagation of plants is the great fluctuation of temperature. If enough bottom heat can be given so that the temperature of the sand can be kept about 80 degrees day and night and the box deep enough so that a piece of glass or newspaper can be placed

HOME PROPAGATION

On the right hand is an arrangement showing how the heat from the furnace is utilized in starting early seeds. The other picture shows a propagating pan on the kitchen range, the pan being stood upon bricks. Geraniums, salvias, coleus, etc., were grown here from cuttings

PROPAGATING GERANIUMS AND DRACENA

Geraniums are grown from cuttings which are merely taken off and inserted in the soil. Dracenas sprout from pieces of the stem which are treated as seeds. See Chapter V

over the top without injuring the cuttings, the difficulty can be got around.

HOME-MADE PROPAGATING BOX

One amateur solved the problem in a very simple and inexpensive way. This is how he did it:

"Three boxes are necessary. Soap boxes will do, if the length and width are equal, so that they will closely fit upon one another. Besides these, there will be needed a large, deep pan; two half-gallon jugs; sufficient zinc to serve as a bottom for one of the boxes; one peck of coarse sand, and a foot heater, such as is used in carriages during the winter.

"Using one of the boxes as a base, bore a few holes near the top for ventilators, which can be controlled by the use of corks. In this lower box place jugs filled with hot water during the day, when little heat will be required. At night use the foot heater, putting in about one-half cake of fuel just before retiring. Take off the top of one of the boxes and nail strips along the sides wide enough to hold the pan of water. This box will rest over the compartment with the heater. Cut the last box so that the back

is about three inches higher than the front, in order to get the best distribution of light. Fill it to the depth of three inches with coarse sand.

"This is the upper box, and should be covered with a pane of glass. If these boxes fit tightly upon one another so no heat can escape, and if the jugs and pan are filled with hot water, a temperature of 80 degrees can be maintained all day by filling the jugs two or three times. Keep a small thermometer plunged in the sand, and for a few days before putting in your cuttings experiment to ascertain under just what conditions the heater will do the most satisfactory work.

"I filled the box with cuttings from rubber plants, plunging them in the sand without other preparation than cutting them with a sharp knife, leaving the surface clean and smooth. I did not lose one of the lot. Rubber plants grow so tall after a few years that one feels impelled to shorten them. This can easily be accomplished by cutting off the top and rooting it. Young plants may also be started from each joint of the old stem, thus from one old plant which has outgrown its

usefulness a great many can be raised easily. After the rubber plants I put in *Pandanus Veitchii* with success. Then I took a few large leaves of *Begonia Rex*, cut the ribs on the back, made a number of incisions in the leaves, and then placed them on the sand, pressing them down to make a good contact all around. From each incision a plant started, and in six weeks I potted off twenty-five sturdy, clean begonias from five leaves.

"During the day I kept my bed in a good light near the window, ventilated it by raising the glass, protected it with paper when the sun was strong, and at night, when cold, I threw a carriage robe over it. From the results I have had I feel convinced that the little propagating bed is as practical as the larger ones used in greenhouses, and will do the same work on a reduced scale."

Before putting the cuttings in the cutting bed the amateur should run it a day or two in order to learn how to maintain an even heat.

HOW TO MAKE A CUTTING

All cuttings of the stems are made nearly alike, the only difference being that with

different kinds of plants the length of the cuttings varies in proportion to the diameter of the stem and the distance between the buds. For instance: a geranium cutting is usually made about three or three and one half inches long, while that of a heliotrope is usually one and a quarter to one and a half inches long.

A sharp knife is needed so as not to bruise the stem. To make a good geranium cutting select a well-ripened end of a stem, cut it off at the required length, and just below a node (where a leaf is attached). It is important that the cut should be made just below a node, for roots are more freely produced than when the cut is made between the nodes. In many instances cuttings will not root at all if the cut is made anywhere but directly under the node.

Trim off carefully all the leaves except one at the top and trim off also all the stipules, those leafy growths on the stems where the leaves join. If these are left on they will decay and may lead to the cutting rotting, too.

Put the cutting in the sand, setting it deep enough to hold it erect, which will be

about three-quarters of an inch. If you are making a lot of cuttings quite a number can be made before putting them in the sand; but do not let the cut surface be exposed to the air too long or the chances of rooting will be greatly lessened.

Geranium cuttings should be set about an inch apart in the row, and the rows about two inches apart. If they are put closer they are much more likely to rot. Always dibble in the cuttings; simply forcing them down into the sand will injure the ends so that the cuttings will not root. After putting the cuttings in the sand, water them and shade them from the sun with a single sheet of newspaper. Other plants which may be propagated this way are heliotrope, ageratum, coleus, abutilon, hydrangea, etc.

The dracæna is another plant which may be cultivated by cuttings of the stems, but instead of making these cuttings as I have described for the geranium, the long, bare stem is cut into pieces two or three inches long, each of which must have a node, and the pieces laid down in the sand — they should be just covered. Each piece will

make at least one new plant. When the new growth is 2½ to 3 inches long, it is taken off the old stem and put in the cutting bench just like any cutting of the stem. The old stem is left in the sand for it frequently will provide more cuttings.

The bouvardia (one of the best plants one can grow for cut flowers at Christmas time) is increased in much the same way, but instead of cutting the stem into small pieces the root is cut up and the pieces treated exactly as if they were seeds.

PROPAGATING BY LEAVES

That new plants can be made from the leaves of old plants is a never failing source of interest to a great many people. The plant which is most commonly propagated this way is *Begonia Rex*. Take an old leaf and turn it upside down on a board, and with a sharp knife cut the veins. Then place the leaf right side up on damp sand, pin it down with toothpicks which have been bent in two, and shade it. At each cut in the leaf's vein a new plant will be formed. As soon as they have made a couple of small leaves separate the young

plants from the old leaf and pot them off in a sandy soil with lots of leafmould in it.

The pretty little marble-leaved peperomia is another plant propagated from the leaf, but instead of cutting the leaf it is laid on the sand and the leaf stalk covered up. The gloxinia may also be propagated by tubers forming at the cuts.

The umbrella plant (*Cyperus alternifolius*) is perhaps the easiest of all plants to propagate by rooting the leaves. It is the simplest anyway. Cut off the bunch of leaves with, perhaps, one-quarter or one-eighth of an inch of stem, and put it in water. Never allow the water to become stale, which is best done by adding to it a few pieces of charcoal. In a few weeks a new plant will be seen pushing up from among the leaflets. Carefully separate it from the old leaf and pot it up.

PROPAGATING BY OFFSET

Some plants produce a lot of suckers or rosettes at the base of the plant, near the ground. Familiar examples of this are hen and chickens, and the screw pine (*Pandanus Veitchii*). The former forms

little rosettes which simply have to be taken off and put in sand for a short time. The suckers from the screw pine are taken off, the leaves shortened back to reduce transpiration, and then put in the sand like cuttings of other plants. They root in a few weeks.

PROPAGATING BY RUNNERS

Runners differ from offsets in that the plant produces a small wiry stem which will form a new plant if the end is covered with soil. The two commonest house plants increased by this method are the strawberry geranium and the sword fern. The strawberry geranium will form new leaves on these runners before roots are produced, so if there is not a chance to allow them to root in the pot before separating the young plantlets from the mother plant they may be taken off and put in sand like any ordinary cutting. The young ferns must be rooted before being separated from the parent plants.

MAKING NEW RUBBER PLANTS

A well-kept rubber plant will in a couple of years become too ungainly for the house. Many times one does not care to part with

WHEN A RUBBER PLANT IS TOO TALL

The bark is slit and moss tied on and kept moist. Roots soon appear and the whole top is severed, making two plants

"TOPPING" WITH A POT

The same process as shown in preceding illustration; the pot is put around the stem at once and rooting is into light soil

it because of some sentiment attached to it. Two things may be done to make a shapely plant. The quickest way to reduce the plant is to cut it down to within a foot or fifteen inches of the ground. New shoots will appear in a short time that will transform the stub into a shapely, round-headed tree.

The other thing to do is to make a slanting cut in the stem far enough from the top so that when cut off it will make a shapely plant. Put a small piece of wood or charcoal in the cut to keep it open. Over the cut lay some damp sphagnum moss, and be sure that it always is damp, but do not let it become too damp or it may get sour. In a few weeks new roots will be seen protruding through the moss. When a mass of roots has been produced cut the stem off below the moss and pot the plant, moss and all, in a good potting soil. Put it in a shaded place for a few days until the roots have taken hold of the soil.

This method is often varied by carefully splitting a pot in halves, putting them about the stem of the plant, and then filling the pot with a mixture of soil and sphagnum

moss. The moss is added to prevent rapid drying out of the soil.

Any plant which will grow from cuttings may be increased by this method, but it is usually employed only on hardwooded plants like the rubber plant, ardisia, dracena, etc.

CHAPTER VI

In Sickness and in Health

The relationship between plants and people — High temperatures — Cold draughts — Bad watering — Dust — Chills — Unnecessary fussing — Coal and illuminating gases — Insect pests and remedies — Freak remedies.

The ideal conditions for house plants are practically the same as for human beings; that is, a temperature of about 65 to 70 degrees during the day time, and 50 degrees to 55 degrees at night. It may not always be possible to maintain this warmth at night, but strive to keep as near it as possible.

Plants grown in a window will invariably turn to the light, and unless the position is frequently changed, they will become one-sided. To avoid this, turn the plants half-way around each day, so that each half of the plant will get an equal amount of light.

During the winter have a care that none of the leaves of the plants touch the glass

during the night or when there is frost outside, because it will at least chill, and maybe kill them.

On very cold nights move the boxes or pots away from the window and put newspapers in front of the glass, but leave a dead air space between.

The next consideration is fresh air; keep the rooms well ventilated, *i. e.*, have a window open somewhere in the room, preferably on the opposite side from the plants, for they cannot stand draughts. When a room gets too warm and too dry, the plants transpire an excessive amount of water — faster than the roots can supply it from the soil — but, worse still, the surface of the soil itself is dried out, and even the pot as well. Thus an irreparable injury is done before the owner realizes it.

TOO HIGH A TEMPERATURE

When plants are grown in an abnormally high temperature, with moisture, the growth is forced, and, being soft, is easily injured. A strong draught, even if only 10 degrees or 20 degrees cooler than the surrounding air, will seriously chill plants in this con-

dition. The result will be that plants like the geranium and heliotrope will turn yellow and drop their leaves; with palms, the tips of the leaves will turn brown. To get the plants back into proper condition will take months of careful attention, and in the case of palms or ferns it will take a year — preferably at the florist's.

To give the atmosphere the proper amount of moisture have a small dish on the radiator, register, or stove, and keep it full of water. Most hot air furnaces have a water compartment inside the jacket which holds about a pailful. Under ordinary conditions this will need filling only once a day, but during the coldest days of winter, when the firing is heavy, it may be necessary to fill it twice.

WATERING

The second most exacting requirement of plants is watering. Too much water will make the soil sour; with too little water the plant will wilt. The effect of either will be yellowing and dropping of the leaves. It is easier, however, to drown a plant than to kill it by drought. No hard and fast rule for

watering can be made. Plants may need water twice a day or only once in two days. The best way to determine whether a plant is dry is to tap the pot sharply with the knuckles of the hand. A hollow, or ringing sound shows that the soil needs water; a heavy, dull sound indicates that it has sufficient moisture. Usually you can tell whether the soil needs watering by looking at the surface. If it is dry and powdery give water.

The common fault in watering is not doing the job thoroughly. Never give a little surface sprinkling. The best way, if convenient, is to take the plants to the sink or bath tub and give the soil a good watering, allowing the pot to stay in the sink until the surplus water has had a chance to drain off. If it is impossible to do this, have a saucer under each pot and ten or fifteen minutes after the watering go around and turn out all the water standing in the saucers. Never allow water to remain in the saucers as it will prevent aeration through the hole in the bottom of the pot, and also it will rot the roots. When plants are kept in jardinières people often grow careless, let water collect

in the bottom and then wonder why the plant is not doing well.

If by any chance the ball of earth should become very dry, plunge it in a pailful of water and let it stand five or ten minutes — until the whole ball is soaked through. When the air-bubbles cease to rise the ball is generally thoroughly soaked. Pouring water on the top of the soil of a dried-out pot plant is generally useless because the ball contracts in drying and leaves a small space between itself and the pot down which the water will run.

DUST ON THE LEAVES

Bathe the leaves frequently to remove dust, which will inevitably settle on them and choke up the pores. When the plant is in the sink or tub a hand syringe can be used to spray the foliage without wetting the floor. If this is inconvenient then carefully rub over the surface of each leaf with a damp sponge. If necessary, a little soap may be used in the water.

DISTURBING THE ROOT

Many amateurs do serious injury to their house plants by not leaving well enough alone

while growth is dormant, or almost so. It is simply folly to fuss about with potted plants at that season. Do not disturb the roots at all during the winter, for most plants are resting and cannot quickly put out new roots. This is particularly true of such decorative plants as palms, rubber plants, and ferns, which can be shifted or fed with fertilizers only in summer. Soft wooded plants, like geraniums and heliotropes, are not so easily injured by transplanting, but even so I prefer to put them in large enough pots in the fall so that they will not need shifting until spring. If they should need extra feeding, on account of large growth, it is much better given in liquid form.

LIQUID FERTILIZERS

The best form of liquid plant food is made from cow manure — at the rate of two bushels to a barrel (fifty gallons) of water — because there is no danger of burning the roots; horse manure and sheep manure are also good, but they must be used very weak (one bushel of the former, and one-half bushel of the latter to a barrel of water) or they will injure the roots. I have used

MAKING NEW BEGONIAS FROM A LEAF

A single leaf of the Rex begonia is cut through the veins and laid down on some light soil. New plants develop where the veins are cut

THE EFFECT OF DRY AIR

One of the commonest causes of trouble with house plants is an undue dryness of the air, causing the young growing tips of the plants to collapse and die. Illuminating gas in small quantities is equally fatal

horse manure very successfully when the liquid was the colour of very weak tea. These are mussy to handle. Neater are the special plant foods put up in tablet, liquid, or powder forms. These can be bought in the local stores, or ordered from the catalogues of seedsmen.

If you wish to make a good liquid fertilizer at home the following recipe will give satisfaction. To one gallon of water add eight ounces of nitrate of soda, sixteen ounces of monobasic calcium phosphate, and ten ounces of sulphate of potash. For use dilute it, using one part of this stock solution to thirty parts of water, and use it about once a week.

COAL OR FURNACE GAS

Perhaps the greatest enemy of plants grown in houses heated by hot air furnaces or coal stoves is coal gas. An otherwise imperceptible trace of it in the air will cause the leaves of some plants (as Jerusalem cherry) to drop off promptly. With a good chimney draught and with proper regulation of the dampers when attending to the fire there should be no trouble from this source.

Illuminating gas is almost as bad as coal gas. The slightest trace will retard the development of new leaves on all but the toughest-textured plants, like rubbers and palms. Such thin-leaved plants as geranium, coleus, heliotrope, and begonia succumb quickly. When gas is present in very small quantity the plants do not necessarily die but growth is stunted and the flower buds wither when beginning to show colour, looking much as though they had been chilled.

TOBACCO FOR PLANT LICE

The commonest insect enemies of house plants are the plant lice or aphides. Look for these pests on the under side of the leaves where they suck the sap. Against them use tobacco water or soap suds. Tobacco water can be made from tobacco "stems" which can be bought from almost any florist or seedsman. Put a large handful into a gallon of warm water and let it stand for twenty-four hours, then dilute it to the colour of weak tea and syringe the foliage, being careful to hit the under side of the leaves. A simpler way is to buy a tobacco extract and follow the directions on the package.

If soap suds are used rinse the plants with clear water afterward.

If the plants are grown in a conservatory, or a room that can be completely shut off from the rest of the house, fumigating is the easiest and best method of fighting the aphides.

For this tobacco stems can be used, but the tobacco preparations offered in the stores are easier to handle, according to directions.

One can now buy sheets of paper which are impregnated with tobacco, and all that is necessary is to distribute enough sheets about the room to give the required density of smoke and set them afire.

Whatever method is used select a quiet night for it and shut the room tight. By morning all evidences of the smoke will have disappeared. Then syringe the plants to knock off the aphides. Badly infested plants will need fumigating twice a week on successive nights.

A SIMPLE FUMIGATOR

A simple fumigating device may be made from a soap box and three or four paper flour sacks. Turn the box upside down and in the bottom bore a lot of one-inch holes. In

one end of the box make a hole big enough to put a saucer through. Cut open the sides of the bags in such a way that they can be pasted together again to make one large bag, the open end of which will fit over the box.

Now place the plant or plants to be fumigated on the still inverted box and draw the big paper bag down over them and tie it securely to the box with a string. In the saucer place one of the forms of tobacco — ground tobacco, or tobacco soaked paper or tobacco punk — light and place it inside of the box. Be very careful when fumigating the plants not to use the tobacco too strong or the leaves will become scorched. When the sack has become sufficiently filled with tobacco, remove the burning tobacco from the box. Let the plant stand half an hour with the sack on, then remove it, and syringe the plant with water to knock off the stupified aphides. Two light fumigations on succeeding days are much less liable to injure the plant than is one strong fumigation.

THE ROOT APHIS

An aphis sometimes attacks the roots, causing the plants to take on a sickly or

yellow colour. It is easily found by digging down near the base of the stem, and is attacked by watering with the tobacco water already described. If this does not kill the aphides the plant must be removed from the soil, the roots washed with whale-oil soap (one quarter pound to two gallons of water). Then rinse and repot in fresh, clean soil.

RED SPIDER

Next to the aphides in destructiveness is the red spider, a very small red mite which can scarcely be seen by the naked eye. It lives on the under side of the leaves, but its presence can be readily told by numerous minute yellow spots on the upper side. Like the aphis the red spider subsists on the plant's juices. It thrives in a hot, dry atmosphere, and its presence is a sure sign of insufficient moisture. The conditions ordinarily found in living rooms are very favourable for this pest. The remedy is obvious: syringe the plants with water, applying it on the under side of the leaves, and with considerable force because the spider is protected behind a web.

MEALY BUG

Mealy bug, which is almost always present in the greenhouse, sometimes infests house plants, too. This insect looks like a small tuft of white cotton, and is found on the under side of the leaves and in the joints. A strong stream of water will usually wash it off, but if that fails use kerosene emulsion or fir tree oil, which must be diluted according to the directions on the package, and applied as a spray or with a feather. Alcohol has also been successfully used when there were only a few mealy bugs. With a feather or small stick put one drop on each bug, and he will immediately succumb.

VARIOUS SCALES

Very often scale insects will be found on the leaves of palms, ferns, rubber plants and cycads. The commonest one is the brown scale. It is one-quarter to three-eighths of an inch long, and nearly as wide, and its hard, convexed shell is dark brown in colour. The other scale commonly found on greenhouse plants is white, and about the size of the head of a pin.

Both these scales can be removed easily by spraying with whale oil soap, kerosene emulsion, or fir tree oil.

THRIPS

Sometimes plants are infected with thrips, which eat the epidermis of the leaves. They are small, slender, brown or black insects, about one-fourth of an inch long, and are easily controlled by any of the contact insecticides already mentioned, or by Paris green — one teaspoonful to twelve quarts of water.

If angleworms infest the soil in the pots they may easily be got rid of by watering with lime water which may be made as follows: To ten or twelve quarts of water add one and one-half to two pounds of fresh lump lime, letting it stand for a couple of days, or until the lime has slacked and the water cleared, then pour off the clear water for use. Several waterings with this at intervals of three or four days will drive out the worms.

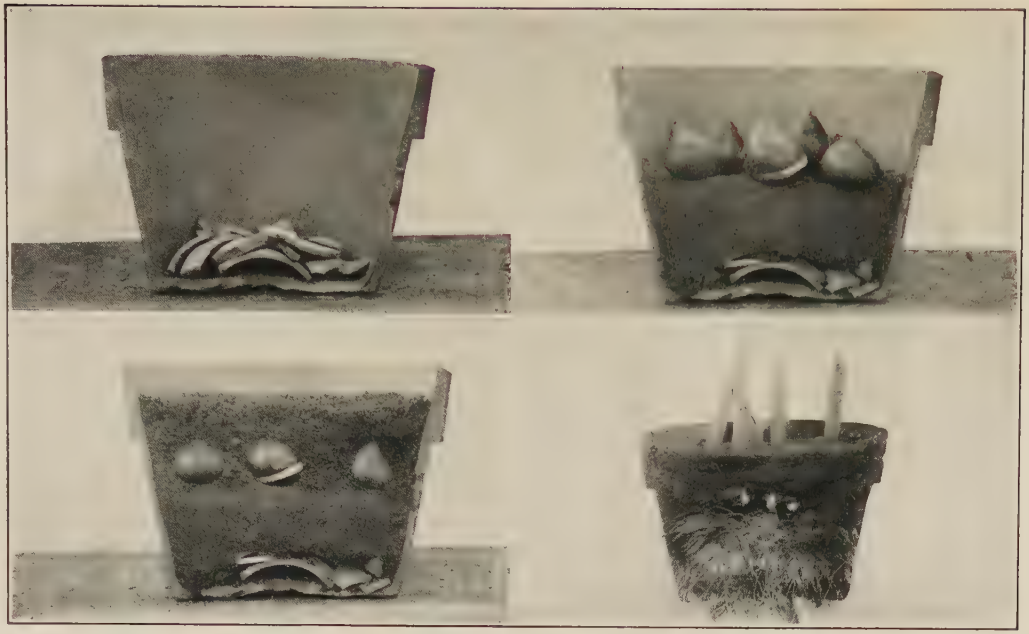
FREAK REMEDIES

There are numerous freak remedies sometimes suggested for ailing plants, varying from

applying beefsteak and castor oil to the roots, to coating the leaves of such plants as rubber trees and palms with milk or olive oil.

I never could understand why plants should need castor oil; in fact, it is a decided detriment, for it will clog the soil. When the plant begins to look sickly, look at once for the conditions which have caused it; it may be one of the causes mentioned in this chapter. There is a popular fallacy that if iron filings are put in the soil in which sickly plants are growing, their youth will be renewed. There is sufficient iron in any soil for plants, and any addition to the soil will be only a waste of time and money.

I can readily understand why wiping off the leaves with milk or other oily substance is resorted to; it makes the surfaces of the leaves shine. Every time this is done it is at the expense of the plant's health, for the fatty substance will surely clog the pores of the leaves, retarding or completely stopping the transpiration. The leaf of a healthy rubber plant or palm will shine if the dust is wiped off each day. This should always be part of the daily routine in the care of house plants.



HOW TO POT BULBS

First give plenty of drainage. Half fill the pot with soil and put the bulb in position. After adding more soil, bury the pot in a cool place, so that roots may develop. Bring into light and heat, and begin forcing when the growths have attained the size shown in the last picture. Failure to flower results from forcing before roots develop properly

FORCING BULBS IN THE HOUSE

The crocus is generally regarded as one of the most unsatisfactory bulbs to force, but it will respond if not hurried too much. The upper view shows the stage when the pots are brought into the light. Note the excellent foliage

CHAPTER VII

Bulbs from Thanksgiving to Easter

The Dutch and Cape groups — How they differ — Tulips, hyacinths, and daffodils — Potting and rooting — Bringing into the light — Time required —Oxalis, fuchsias, sparaxis, and ranunculus.

The easiest plants for the amateur to grow in the window garden are the bulbs. Roman hyacinths can be had by Thanksgiving; indeed, it is hard to fail with these charming flowers, and they come in red, blue, and white.

There is a long list of available bulbs, but most of them belong to one of two classes — Dutch bulbs and Cape bulbs — and all of each class used need similar treatment.

THE "DUTCH" GROUP

The bulbs which are known as "Dutch" in the trade are tulips, hyacinths, narcissus, crocuses, snowdrops, etc. To these might be added the Bermuda and Madonna lilies, because they require much the same treatment.

When the bulbs are received from the bulb merchant, about October 1st, put them in a good soil. I have used the soil described in Chapter II. Leafmould is not an essential, but I prefer to use it.

PANS OR POTS

Put the bulbs in pans rather than in pots. Six-inch pans are the best for the small bulbs like crocuses, snowdrops, and bulbocodiums; the polyanthus narcissus are generally grown in six-inch pots; one, two, or three bulbs to a pot, according to the size of the bulbs. Tulips, hyacinths, and daffodils are best grown in eight-inch pans. Pans look better than pots — there is not such an expanse of red clay — and besides, they do not take up as much room. Set the bulbs to a depth to have them just covered with soil. After potting give them a good watering and set them away to make roots.

The secret of bulb culture lies almost entirely in the root development. If the bulbs are not well rooted before they are forced they will not make good flowers.

But no amount of care will increase the

number of flowers, for that is already determined — the buds are already formed in the bulb — but the size of the flowers depends largely upon having good heavy bulbs and giving them proper treatment before forcing. To secure a good root system on the Dutch bulbs put them, after potting, in a cool, dark place and keep the soil moderately damp for at least six weeks, except that Roman hyacinths can be forced after three weeks, and will flower in two or three weeks. I prefer to bury the bulbs about a foot in soil outdoors. When the ground begins to freeze a mulch of leaves or manure, sufficiently thick to keep the soil from freezing, is put on them. Here they are left until wanted for forcing.

One amateur solved the winter storage of her bulbs as follows:

"The construction of the pit was of the simplest. A bottomless box was sunk in the ground to a depth of three or four inches — enough to make it stand firm. This left an enclosing board frame about nine inches high above the ground level. Inside this frame the earth was dug out to a depth of eighteen inches, and a layer of coarse coal

ashes spread on the bottom, to insure good drainage. On this foundation the pots of bulbs were placed. The spaces between the pots were filled with sphagnum, and a layer of moss was laid over them. The box was then filled in with clean oat straw, tucked in with a warm blanket of old carpet, and instead of a glass sash a tight wooden lid was fitted on and held in place by pine boughs. All these precautions are necessary here, for the thermometer sometimes registers 35 degrees below zero!"

ROOTING IN THE CELLAR

If neither of these methods is convenient, and you have a *cool* cellar, put the pots in a dark, out of the way corner and cover them with a foot or so of soil. Here they will always be handy for bringing into light and heat as required; but watch out that the mice and rats do not get at them.

For Christmas flowers force Paper White and polyanthus narcissus, Roman hyacinths, and the Duc van Thol tulips. They will require four weeks (except for the hyacinths, which are one week less) after being brought out into the light. The other Dutch bulbs

will not force well so early in the year, and should not be brought into heat until about Christmas time, or later, according to when the flowers are wanted.

By bringing in the pots in batches in succession, at intervals of say ten days apart, flowers can be had from about January 20th until outdoor spring flowers appear. The pots or pans merely need digging from the ground and being put in the window garden, and the bulbs will at once commence to grow if not exposed to frost. On very cold or windy nights move them back from the window. They cannot help flowering if given decent treatment. Failures with bulbs are due, largely, to careless treatment.

THE BEST TULIPS

Good tulips for early forcing are Proserpine, Yellow Prince, Chrysolora, Vermilion Brilliant, La Reine, Rose Grisdelin, Cottage Maid. The other varieties do better if not started until late in January or early February. Do not try to force double tulips until late in February.

To get the Easter lily in flower for Easter, forcing must be started early — not later

than December 1st — varying the heat according to the progress made. The lilies are grown one to a six-inch pot or several to an eight-inch pot.

The easiest bulbs to grow are the Roman hyacinths which may even be had in flower at Thanksgiving, Chinese sacred lily, and Paper White narcissus. These can be grown in water, or in cocoanut fibre or sand, requiring the same treatment as in soil.

The easiest plant to grow in pure water is the Chinese sacred lily; but you must be careful not to let a cold draught strike the buds or they will "blast." Heat causes the same thing. A temperature of about 50 degrees at night will give the best results. Get a shallow bowl and put in enough prettily coloured pebbles to hold the bulb in position.

To grow hyacinths in glasses select only the named single varieties that are specially recommended for this purpose. Use soft rain water. Put in a few bits of charcoal. See that the base of the bulb is always in contact with the water and don't let the water rise much above the base of the bulb. Keep the glasses in a cool, dark, well venti-

lated place until the roots reach the bottom of the glass. Then bring them into light and warmth. Don't put them near a gas jet, especially one that leaks. Move them away from the windows on cold nights. Change the water every few days. The patent glasses make this operation easier. Add two or three drops of ammonia once a week to the water.

THE "CAPE" GROUP

The Cape bulbs consist of such bulbs as freesia, ixia, sparaxis, oxalis — bulbs from the vicinity of the Cape of Good Hope.

As the bulbs are small I believe the amateur should plant them in five-inch pots. He can then make a few bulbs last over a greater season by bringing a pot at a time into heat at intervals of ten days. By starting the freesias and oxalis in August they can be had in flower at Christmas; the balance of the bulbs will do much better if not forced until after Christmas.

The Cape bulbs cannot be stored away in a dark place; they must have a light, cool, but frost-proof place in which to start growth, because they make some leaf growth as the

roots develop. A cool room, having a temperature of 35 degrees to 40 degrees at night, and not higher than 50 degrees during the day, will be excellent. From here they can be brought into the window of the living room as wanted.

The ease with which the oxalis and freesias can be grown, and their beauty, are certainly attractions enough to induce anyone who has inclination to grow flowers to try them in the window.

The ixia and sparaxis, however, are seldom met with even at the florists. Both are cool-loving plants. The ixia does best when grown in a night temperature of 35 degrees or 40 degrees, with a rise of 10 degrees or 15 degrees during the day. It sends up long, grass-like leaves, and finally a long flower stalk, sometimes eighteen inches high, which ends in a spike three to eight inches long, of red, white, or blue flowers, according to the variety. The spikes contain six to twelve flowers, each of which is anywhere from one to two inches in diameter. If successfully flowered they are worth all the time and trouble you have gone to to produce them.

The sparaxis is much less known than the ixia; in fact, some bulb merchants never catalogue it, yet the European dealers recognize as many as twenty-five distinct named varieties. The plants grow six to twelve inches high, and each one produces from one to three or four flowers, each of which is one to two inches across, and funnel-shaped. It can be grown in the temperature of the ordinary window garden with success, for in the greenhouse it succeeds admirably in a temperature of 55 degrees at night.

If you have a cool corner in your conservatory or a window in a cool room, grow some of the named varieties of the poppy-flowered anemone (*A. Coronaria*) and the turbaned or Persian ranunculus (*R. Asiaticus*). They are excellent either as pot plants or as cut flowers. Give them the same treatment as the Cape bulbs, and you are sure to succeed.

The poppy-flowered anemone has a pretty, finely divided leaf and a flower anywhere from one and a half to two and a half inches across, red, white, or blue in colour, and with a big bunch of blue stamens. It

grows six inches to a foot high. If you buy any of the tubers of these I 'll wager you will look at them twice, and then begin to berate the bulb merchant for selling you some old, dried-up tubers, because they are very small, peculiar-shaped things, which apparently have no top or bottom. I must confess I never know whether I have some of them right side up or not. And because of the ease with which a bulb merchant can deceive a customer who is not acquainted with these tubers, I am sorry to say that some unscrupulous dealers have sold two or three year old bulbs as fresh ones. Of course they did not grow. The temptation to do this is great because the sale for them in this country is small; so buy from some seedsman in whom you have confidence.

The ranunculus has a fleshy root which looks like a lot of dimunitive sweet potatoes, one-half an inch long, joined together at one end, the other end hanging free. The plants grow six inches to a foot high, and the flowers in the double varieties, which are the only ones worth growing, are ball-like, red or yellow, one to one and one-half inches across.

Here is a dollar collection of bulbs that gave one amateur flowers every day without a break from Christmas to Easter:

Chinese lilies, bloomed from December 23d to January 12th; Double Roman narcissus, bloomed from January 13th to January 25th; Grand Soleil d'Or narcissus, bloomed from January 22d to February 13th; Crocus, bloomed from February 7th to March 12th; Van Sion narcissus, bloomed from March 7th to March 25th; Princess Marianne tulip, bloomed from March 23d to April 9th.

How many bulbs to put in a six-inch pan is told in this list:

Crocus, six; Freesia, nine; Hyacinth, named, three; Hyacinth, miniature, five; Hyacinth, Roman, six; Ixia, six to nine; Narcissus, three to five; Oxalis, nine; Tulip, six.

Eight-inch pans are more effective for the large bulbs, and six-inch pans for the small ones. Try ten tulips, ten narcissi or eight hyacinths in an eight-inch pan. Many people like to grow hyacinths singly in five-inch hyacinth pots, which are an inch and a half deeper than ordinary flower pots.

CHAPTER VIII

The Winter Window Garden

Gay flowers and easily grown — What to do with the old plants — Setting out in the garden — The best kinds, and their handling — Azaleas, lilies, etc.

If you want a winter garden of high-class flowering plants other than bulbs, at the least expense, make your selection of plants from those mentioned below in this chapter. Most of them will bloom in the dreary month of March, but the azaleas and some others may be had in time for Christmas, if started early. I believe they are the best for beginners, and the plants that are best for beginners are generally the ones that the old-timers come back to after expensive tests of novelties. They are the showy, long-lasting, easily grown coolhouse plants, that you will grow year after year with increasing satisfaction.

GHENT, MOLLIS, AND OTHER AZALEAS

The showiest shrubs are the azaleas. Both the Ghent and mollis azaleas bloom

before the leaves expand. The mollis has flowers two and a half inches across, which are yellow, orange or pink, while the Ghent has flowers in all shades, from white to red and lilac. The Indian azalea is an evergreen, with small, shiny, dark green leaves. The flowers are either single or double, and vary from white to deep red, but lack the fire-like gorgeousness of the mollis varieties. This is the plant also known as Belgian Azalea, as the supplies were largely imported from that country prior to the Plant Quarantine law known as Order 37. A new strain of smaller flowered plants, introduced by E. H. Wilson from Japan, is becoming popular as a substitute and is known in the trade as "Kurume" Azaleas.

If the plants have been shipped a long way and the balls are dry, soak them in water until thoroughly wet; then put them into the smallest pots you can. Use a fine soil, made of fibrous loam, peat, and sand. Pot firmly, and water. They can be stored in a cool, light, airy place with a temperature of 35 degrees to 40 degrees, such as a deep cold-frame, or in the cellar near a window. Water sparingly, but do not allow the

plants to suffer for want of water. Look out for mildew.

The Ghent and mollis azaleas can be had in bloom in about six weeks from the time they are brought into heat. Some of the Indian azaleas are hard to keep from flowering, particularly if you do not want them until late in the season, unless kept very cool. Since the importation of Indian (Belgian) azaleas has been restricted, other evergreen kinds having smaller flowers—the Kurume types—are being grown.

KEEPING OVER THE SUMMER

To keep the evergreen azaleas over until another season requires but little work. Put them in a light place, like a window, until danger of all frost is past, when they may be put out of doors. After flowering, pick off the dead flowers and water freely, in order that they may make a good growth. If any shoots are growing faster than the others, pinch them back, to form a symmetrical plant. Azaleas, like all members of the heath family, are easily injured by too much or too little water; therefore, see that the soil is always just moist, never let it get dry nor water-logged.

Put the plants out of doors when danger of frost is past. Plunge them to the rim of the pot in well-drained soil or coal ashes. This will keep the pots cool, preventing evaporation of water from them. Some people put their azaleas in the full sunlight during the summer; but, generally, it is better to have them where they can get the early morning and late afternoon sun, but are shaded during the midday. Syringe the foliage late each afternoon with the hose or force pump, and see that the under sides of the leaves are hit by the water, in order to dislodge the red spiders and thrips, which will do a great deal of harm if not checked. In the fall store the plants in a cool, light place, where the temperature is from 35 degrees to 45 degrees. Keep them here until you are ready to force them, then bring them into a living room and have the fun of watching the flowers develop.

The best way to keep the Ghent and mollis azaleas over will be to grow them along as described for the evergreen azaleas and to plant them in the ground outdoors when all danger of frost is past.

GERANIUMS THE EASIEST OF ALL

So common that we seldom give its transcendent merits a second thought, yet the easiest all-the-year plant to grow in the house, is the ordinary geranium. It is the cheapest plant for the window gardener. Cuttings started in the spring will flower from about Christmas time on. It is one of the few plants on which the home gardener can rely to keep his house looking gay during the holidays.

The geranium wants a rich soil; but the secret of success with it is not to over water — on the other hand, never allow it to become dry. To use a gardener's expression, keep it on the "dry side." A very pretty way of handling geraniums is as standards. For Christmas decoration the standards covered with large trusses of flowers are beautiful. It takes about two years to grow a good standard, two or two and a half feet high.

THE BEST DECEMBER CUT FLOWER

The bouvardia blooms during late fall and early winter, a time when flowers are very scarce. It produces beautiful clusters of flowers three inches across, which are either white or red or some intermediate shade. It

makes a very decorative plant, and its flowers, when cut, last well in water — indeed, it is a most desirable plant for either the window garden or small greenhouse.

To have good plants for winter flowering, start in March. The usual way of increasing this plant is by root cuttings. (See Chapter V.) Another good way is to divide a healthy plant into pieces small enough to go in three-inch pots. The plants are grown on as rapidly as possible in the house in a night temperature of 60 degrees. During the last week in May, plant the bouvardia out in the open in rich soil, where it can have water and thorough cultivation. Here they will make a rapid growth. Pinch back the leaves from time to time during summer, in order to induce a compact growth.

Late in August, the plants must be transferred to their winter quarters — a house having a night temperature of about 50 degrees. I have always grown bouvardias in pots; but they may be put in a box, setting the plants ten to twelve inches apart. If you have a small greenhouse the benches of which are to be empty during the summer,

the plants may be planted on them in the spring, which will save some work in the fall. A good fibrous loam to which there has been an addition of peat or leafmould and well decayed horse manure and sand, will make an excellent soil for growing these plants.

The bouvardia is rather hard to transplant, so must be carefully handled and, after transplanting, shaded and frequently syringed.

Late in April, or early in May, prune the plants back and, as soon as the weather permits, plant in the open again. Plants which have reached the age of four or five years will make beautiful specimens.

The mealy bug and the aphides will be troublesome. The best way of combating these pests is spraying about once a week. with some insecticide, such as the prepared forms of tobacco.

THE FRAGRANT STEVIA

The most fragrant flower which you can be sure of having for Christmas is the stevia (*Piqueria trinervia*). Take cuttings in January or just as soon as it is through flowering,

and grow them on, shifting them from time to time until they are put in six-inch pots. When all danger of frost is past plunge them outdoors in ashes. Turn the pots each day to keep the plants from rooting through into the ground. Pinch out the ends of the growths frequently so as to induce a bushy growth; for stevia naturally make a loose, scraggly growth. Upon the approach of cold weather store the plants in a light, cool place, and bring them a few at a time, into heat in the dwelling room. By thus working for a succession you have the stevia in bloom during late November, December, and January.

RED BERRIES FOR TWO YEARS

One of the best red berried plants for Christmas is *Ardisia crenulata.* It is easily grown from seed, but is slow. Seeds sown in March or April will bloom the following spring, and have a good crop of berries the next winter. The plant grows in this time nine inches to a foot high. The leaves are a very dark glossy green, and so beautiful that it is well worth growing for its foliage alone.

Skimmia Japonica is a broad-leaved evergreen which is not hardy north of Washington, D. C., but, although rather a slow grower, it is one of the handsomest of the red-berried plants which may be had for Christmas decoration. If seeds are sown in the fall and the young plants carried over winter in a cool place, and planted out in the garden in good soil, beautiful little plants will be had for potting in October, which will bear a good crop of berries that will remain on the plants all winter. These berries are bright scarlet or coral red, slightly angled, and about one-quarter of an inch across. At the present time seeds are scarce, so the best way will be to buy a plant from the florist and carry it over from year to year.

With the best of care and cultivation these plants will probably never exceed a height of two or three feet when grown in pots. One drawback to their cultivation is that only one kind of a flower is borne on a plant so that if one wishes berries he must see to it that he has both staminate and pistillate flowers.

In addition to the winter decorative

qualities of this plant, it is beautiful in the spring, when in flower. It has many small, yellowish white flowers one-quarter of an inch across, which are borne in the axils of the leaves in clusters two inches in diameter.

Another broad-leaved evergreen not hardy North, but which can be successfully grown in a cool room is *Aucuba Japonica*. It is hardy in the South. It is a shrub four to fifteen feet high, with beautiful dark green leaves. Like the skimmia, the flowers are not perfect, so if fruit is wanted care must be taken to grow both sexes, and when in flower shake the staminate ones over the pistillate ones that they may be fertilized. To carry this plant over winter keep it in a deep cold-frame or cool room which does not freeze and keep the soil somewhat dry.

The cheapest red-berried plant which one may have at Christmas is the Jerusalem cherry (*Solanum Pseudo-Capsicum*), which has been described on page 41.

GAY LITTLE PEPPERS

Of late the florists have been growing some of the small red peppers in pots for Christmas. The varieties usually grown (Celestial and

Kaleidoscope) bear a profusion of small fruits an inch to an inch and a half long. They change from green to cream colour, then yellow, and finally bright red, making a happy combination with the lively green leaves. After they have lost their beauty throw them away, for it is no use to carry them over to another year as they are easily grown from seed, but if you take good care of them, the fruits will last until February.

An interesting pepper is the Tabasco, from which the famous sauce of that name is made. It grows about three feet high. There is also a form of this called Coral Gem, that grows only about one foot high, and makes a handsome pot plant. The fruits of both are exceedingly hot.

ASPARAGUS IN BASKETS

Asparagus Sprengeri is one of the very best plants for hanging pots or baskets.

It has woody stems two feet or more long, which bear many small, flat "leaves" which are usually yellowish green. As it weakens the plant to produce seeds it is seldom allowed to fruit, but a well-fruited specimen is certainly a beautiful sight.

I know one florist who had a pair of plants, each of which was about one and one-half to two feet in diameter, which he sold for twenty-five dollars apiece.

EASTER LILIES

Easter is the great floral festival of the year and no other holiday is so intimately connected with flowers.

The favourite colour at Easter is white, just as red is the dominant colour for Christmas flowers. Red stands for warmth and happiness in the dead of winter; white stands for purity and for the Resurrection.

The most appropriate flower for Easter is unquestionably the lily, because it has been associated for the longest time with Easter. The Easter lily of to-day is not the lily of history and of religious painting. It was not until the early eighties that the Madonna or Annunciation lily was displaced as an Easter flower by the Bermuda lily. The Madonna lily does not bloom outdoors in the northern United States at Easter time, as it does in southern Europe, and it is not so easily forced into bloom as is the Bermuda lily. Moreover, the Bermuda lily is generally

considered to be a more beautiful flower. It is a longer and larger flower, and shaped like a trumpet, whereas the Madonna lily is bell-shaped.

The bulbs of these are received in August; pot them at once, and bury the pots outdoors until late in November, when they must be lifted and started into growth. A temperature of about 55 degrees at night suits them very well; but, if it is necessary to have them in flower on Easter day, and it comes early, you will probably find it necessary to put the pots in a slightly warmer situation to hurry development. After the plants have begun to make a good growth (say eighteen inches high) liquid fertilizer given once or twice a week, will be of great benefit. (See page 74.)

You will find it very hard to keep the lilies clean, for the aphis is very fond of them. Spray them frequently with an insecticide like tobacco water, or fumigate them with one of the various forms of tobacco.

THE PARIS DAISY

The marguerite or Paris daisy makes an excellent pot plant for the window garden.

THE INDIAN AZALEA

A favorite Easter-flowering plant. If put outdoors in a cool, shaded place in summer, it can be carried on from year to year, merely being brought indoors in the winter

FOLIAGE PLANTS FOR CHRISTMAS DECORATION

Dracenas and ferns. Of the former the red-leaved *D. terminalis* is the most showy, and the spider ferns shown on the edge are the most resistant to house conditions, trying at the very best

Plants in flower, bought from the florist early in the winter, will remain in bloom all winter if you remove the flowers as they fade. When all danger of frost is past plant it outdoors, and it will give scattering blossoms all summer. Do not attempt to bring it into the house next fall, but as soon as the frost has killed it pull it up and throw it away. If it is convenient to grow a few plants of the marguerite for next winter's flowers make cuttings of the ends of the branches in the early part of May and as soon as rooted plant outdoors and pot early in September. As it is rather difficult to lift, considerable care must be exercised; but it can be safely done.

THE PELARGONIUM OR SHOW GERANIUM

A close relative of the common or zonal geranium is the pelargonium (*Pelargonium domesticum*) of which the Martha Washington geranium is the most familiar example. This does not have as many flowers in a truss as the geranium, but they are larger and much handsomer. The flowers usually have a white ground, and are variously marked or blotched with red or purple.

These plants are usually flowered in May and June; but by starting them into growth earlier they may be had in flower at Easter time. As soon as the plants have done flowering remove the old flower stalks and set the plants outside in the full sun. Here let them ripen their wood, and gradually withhold water, giving the plants a good rest. In September prune them into shape, cutting back as one may fancy, but removing all soft and weak shoots. Then shake the old soil from among the roots, and repot them in a smaller-sized pot than they have been in, one in which you can just get the roots comfortably. Give them a thorough watering, and place them in a deep cold-frame. Here they may be left until late in the fall, so long as they are protected from frosts. In October transfer the plants to the house. In January they will need a shift into the larger pots in which they are to bloom.

During the midwinter months give only a small amount of water. As they grow, pinch out the shoots, in order to get a well shaped plant; also take out any weak shoots which may start. Discontinue stopping the

branches in February, as the flower buds commence to form.

The appearance of the plant will be greatly improved if trained to a stake. This must be done before the wood hardens, which it does quite rapidly.

As soon as the plants are well established in their flowering pots apply manure water and keep this up until the flowering time.

The red spider and the aphides will surely bother. Syringing the plants with one of the tobacco extracts which has been diluted with water will be the best preventive, as the foliage is tender, and is easily injured by fumigation with tobacco stems. The blooming season is prolonged by giving the plants a slight shade.

THE YELLOW FLOWERED GENISTA

The genista (*Cytisus Canariensis*), a handsome evergreen shrub, bearing many spikes of small, yellow, pea-shaped flowers, is very easily handled, and I would not be without some good specimens. After they have flowered, in March or April, cut back the plants, give them a small shift, and put them in a close atmosphere and syringe daily until

well established, then give plenty of air and a slight shade. As soon as the danger of frost is past put them out of doors for the summer, and syringe daily. Leave them out until frost threatens, then store them in a cool greenhouse — one having a temperature not exceeding 40 degrees at night, or in a pit or deep coldframe where frost will not reach them. See that they have plenty of light and air, as they mildew easily. When ready for forcing give them a temperature of 50 degrees at night, and they will flower in a few weeks.

The genista is easily grown from cuttings, which should be taken from the plants after they are through flowering. As soon as they are rooted pot them up in two-inch pots and shift them to a larger size if necessary later on. As soon as all danger of frost is past plant them out in the open ground. Here they will make rapid growth, and will probably need a six-inch pot in the fall. Store until ready to force in a light, cool place.

THE TENDER HYDRANGEA

The hydrangea (*Hydrangea hortensis*) may be forced year after year without any effort

or injury to the plant. There are a number of different varieties of this, the flowers varying in colour from white to pink and light blue. Much can be done to induce the blue colour in the flowers by watering the plants all summer with a weak solution of alum. To make: dissolve one pound of alum in two quarts of ammonia and add the whole to twenty gallons of water, mixing it well. Always use this for watering the plants, and do not expose the plants to direct sunlight. This must be used when the plants are making their growth in the summer previous to being forced. When the hydrangea is through flowering cut it back, say in May, removing about half the growth. If you cut back more than this there is likely to be a strong growth from the roots which will not flower the following year. The plants may be either set in the open ground or repotted and plunged outdoors. Grow them outdoors until danger of frost; then bring them in and store them in a very cool and light place. All summer the plants will need an abundance of water, twice a day at least on sunny days, for they are thirsty plants, and give them liquid fertilizer occasionally.

During the winter, while stored, give them only enough water to keep the wood from shriveling. The leaves will drop off, but that is only natural, so do not be alarmed.

To get the plants in flower for Easter start them early in January, as they need about twelve or fourteen weeks to force properly.

This hydrangea is not perfectly hardy outdoors unless given a warm covering, the canes die back in the ground unless protected. The best way is to lay down the canes on the ground and cover them with several inches of soil. Do it before the hard frosts come.

THE JAPANESE SPIREA

The best feathery white bloom in winter is that of *Astilbe Japonica*. It is also one of the easiest to force. There are quite a number of improvements over the type. The best of all is Gladstone. There has been introduced recently a pink flowered variety, Queen Alexandra, a very desirable form.

The astilbe is a hardy plant, and it may be forced repeatedly. The roots are bought from the bulb merchants. They do not

arrive from abroad, however, until about November. As soon as received pot them up in a good potting soil, water them, and store them in a cool, dark place.

It takes ten to fourteen weeks to flower the astilbe, so if you want the plants for any special occasion you must figure ahead a bit. The astilbe is not at all particular as to temperature, anywhere between 50 degrees and 60 degrees will do. Anything above that will cause a flabby growth and the plant will have no lasting qualities. When through flowering keep the plants in a light place until all danger of frost is past, when they can be planted outdoors in the border and left until a year from the following fall, when they may be potted up and again forced.

FORCING GLADIOLUS

A lot of pleasure may be had from forcing the gladiolus. The best one for this is *G. Colvillei*, an early blooming hybrid, which has many varieties. For Easter bloom the bulbs need not be started until December.

The secret of success in forcing gladioli is to grow them cool. A night temperature of 45 degrees to 50 degrees is plenty warm

enough. Plant them in boxes six inches deep, setting the bulbs three inches apart each way. Make one inch holes in the bottom of the boxes every six inches, and give good drainage. Some good varieties are the Bride, Ne Plus Ultra, Shakespeare, Cardinal, and May. With these you are almost sure to succeed. The late flowering varieties are more or less likely to go "blind," *i. e.*, the buds fail to expand.

THE HORTENSIA

The most showy, early flowering plant for indoor forcing. It may be flowered for Easter and is easily wintered by burying or in the cellar

MARTHA WASHINGTON GERANIUMS

Much more gorgeously coloured than the common, or zonal, geranium, but not so free-flowering and not so easy to handle

CHAPTER IX

Flowering Plants for House Conditions

Those that are sure to succeed — The most floriferous and also easily grown — Kinds for sunless windows — Shrubs and bulbs that will flower at any season — Begonias — Callas — African lily, etc.

A window garden without some flowering plants would be monotonous, but in the majority of cases palms and other plants grown for their foliage will be the more easily managed. The constant change added to the living room by the growing of some flowering plants will, however, more than repay for any trouble one may be put to in order to have good specimens.

In addition to the plants mentioned in other chapters the following plants may be grown in the house with reasonable ease.

FOR SUNLESS WINDOWS

Next to the geranium I believe the fibrous begonias will give most satisfaction. They are easily grown, and will remain in bloom

for long periods, the plant producing new clusters of flowers as the old ones begin to fade. The flowers, according to the kind, range from red through pink to white and are quite showy, particularly the red ones.

The showiest begonia for the house is the coral begonia (*B. coccinea*), but almost universally known in the trade as *B. rubra* or *B. maculata*, var. *corallina*. If planted out in the greenhouse it will grow eight to ten feet in height, but in pot culture one can expect a plant having a reasonable amount of care to grow from eighteen inches to three feet in height. The stems are bright green, and are very stiff and upright, giving the plant a rather columnar habit. The leaves are from three to six inches long, and about half as wide, with wavy red margins. The flowers are about half an inch across, deep coral red in colour, and are borne in rather large clusters. In a sunny situation the plant will produce flowers during three or four of the winter months.

Another begonia, nearly as good as the coral begonia, is *B. semperflorens*, var. *gigantea rosea*. A young plant started in the late winter or early spring months will grow so fast that during the succeeding winter it

will need a seven or eight inch pot. The plant will be eighteen inches to two feet in height, and will produce many clusters of large, rosy red flowers.

Probably the best variegated foliaged begonia is *B. metallica*. It is a very attractive plant, either in or out of flower. The leaves are from three to six inches long, about half as wide, and the general outline is a sort of oblique heart-shape. The edges are more or less notched. The upper surface of the leaves is green shaded with bronze, giving a lustrous bronze-green effect. The large veins are depressed and very dark red, adding, naturally, to the effect. The flowers are borne in medium-sized clusters, are quite numerous, and bluish white in colour.

As a result of crossing *Begonia metallica* with *B. sanguinea*, a beautiful hybrid (*B. Thurstoni*) has been produced. The leaves are much the same shape as in metallica, but are a little larger; the colouring is also similar to metallica. The flowers, which are small and rosy white, are insignificant.

There are two spotted-leaved begonias, *B. albo-picta* and *B. argentea-guttata*, either one of which is worth having. The leaves

are glossy green with small, silvery-white spots. They will make plants one and one-half to two feet high.

Some of the fibrous-rooted begonias do not have stems, the leaves coming directly from woody rhizomes which grow at, or just above, the surface of the soil. There is one of this class of which I am quite fond, *B. heracleifolia.* The beauty of the plant lies in its deeply divided leaves. They look like huge five or six inch pointed stars. The leaf stalks are anywhere from six to eighteen inches long, depending, of course, on the size of the plant; the leaves vary from six to twelve inches across. The upper surface is rich green, the under side reddish, and on one of its varieties the leaf stalk is covered with long, reddish, fleshy hairs.

In the late winter months the begonias produce long flower stalks which are crowned with a large cluster (often measuring six to nine inches across) of pink flowers. These will last in good condition for a long time.

Another of these begonias which is sure to be a success is the so-called beefsteak begonia (*B. sanguinea*). The leaves are roundish, leathery in texture, dark green

above and red below, and often measuring six to eight inches in diameter. This seems to thrive in darker places than where most begonias will grow. It is an admirable plant for a north window. In the early spring months it sends up some spikes bearing pinkish white flowers. In addition to the kinds mentioned above there is a host of others sure to do well in the house without going to a lot of extra work and fussing in order that they may thrive.

Begonias are easy to grow. All those having stems may be increased by cuttings. Those having rhizomes are cut into pieces about an inch or two long; these are put in the cutting bench, much as you would plant so many large seeds. A good soil is made by mixing together two parts well rotted sod, one part peat or leafmould, one part well-decayed horse manure, and one part of sand. Give ample drainage.

The best time to repot begonias is in the spring, but it may be done any time during the summer. Never attempt to do it during the winter. In summer put the plants outdoors where they will be protected from heavy winds and the midday sun. In the

winter grow them in a sunny window. If the glass has an unequal surface you will need to be very careful that the foliage is not damp when the sun shines through the glass as the rays may be focussed, causing burning.

THE BEGONIA FOR WINTER FLOWER

The most popular winter-flowering begonia on the market at the present time is Gloire de Lorraine. It is, however, not the easiest to grow, even professional gardeners sometimes having difficulty with it; but I have seen good specimens grown in the house. If you attempt it at all, be prepared to give special care. If it succeeds you will be amply repaid, for the plant is a mass of soft, rosy pink flowers from October until April. The best way will be to buy a plant from the florist when it is in flower, and grow it on. When the plants are through flowering in the early spring months, give them a rest, *i. e.*, do not give them so much water; but, of course, they must never get dry. Keep them in a cool, but light place. By May they will be ready to start into growth once more. Comparatively speaking, little growth will be made during the summer, but the plants

must be kept in a shaded position. After the hot summer weather is past, they will make a rapid growth, and should be gradually inured to full sunlight. If you are growing them in a small greenhouse or window conservatory, get them as near the glass as possible.

The best plants of this begonia are those which are started from cuttings in the early winter (December). At that time there are plenty of good healthy leaves from which to propagate and a few will not be missed. Cut off the leaf stalk to within one-quarter of an inch or so of the leaf blade, and place it in sand. A little bottom heat is better, but the leaf will root even without it. Keep the temperature of the cutting bench about 70 degrees, and the atmosphere humid by putting a sash or light glass over it. When the plants have rooted, pot them off into small pots. One of the secrets of success with this begonia is never to over-pot; when shifting advance one size at a time.

A lighter form of Gloire de Lorraine is called Turnford Hall. The flowers are light pink and white — about the shade of apple blossoms. It is well worth growing for

variety. There are other varieties of this very desirable begonia that have been introduced recently. They are all sports and vary only in the color of the flower.

FUCHSIAS FOR THE PORCH

The lady's ear drops (Fuchsia) has been one of the most popular house plants for years. It is an easily grown plant, is a fast grower, will remain in bloom for several months during the winter, and does not need to be grown in the sun. A north window has sufficient light for its development. Very shapely plants can be grown without much difficulty. All that is necessary is a little pinching and the plant must be frequently turned so that all sides will have an equal amount of light.

The charm of the fuchsia is in its flowers. The most common one, *F. speciosa*, has a long, white, or creamy white, calyx tube, one to one and a quarter inches long, with four narrow, pointed lobes. The petals are red. There are many forms of this, both single and double, the chief point of difference being the colour, which varies to flowers having red calyx tubes and red to purple petals.

THE BEST FLOWERING BEGONIA

Begonia Gloire Lorraine, pale pink flowers, is one of the most showy plants for Christmas. It can be grown indoors by careful handling. See page 120

COBEA VINE IN A WINDOW

The overhead tracery helps wonderfully in making a real picture of the window garden. Begonias, geraniums and ferns flourish here

The flowers vary in length; in some it is very short, while in one variety, Earl of Beaconsfield, it is three inches long.

To get good plants for winter bloom start the old plants (which have been resting) into growth in December. By January or February, there will be plenty of new shoots from which to make new cuttings. Do not use old, hard wood or even new growth which has become hardened. Make the cutting two joints long. As soon as the cuttings have rooted, put them in two-inch pots, using a rich soil. Keep the plants growing along rapidly, shifting them to larger pots as needed, and frequently pinch out the ends of the new growth in order to produce stocky plants. These will make good plants in five or six inch pots the following fall. The fuchsia is easily grown from seed. A night temperature of about 55 degrees is needed for its best development, but if the temperature goes a few degrees lower at night, no harm will be done.

For porch decoration, or for planting in shaded places about the porch in the summer, start the plants indoors from cuttings in the fall. After flowering, the plants need

a rest for several months. If this resting period is during the early spring put the plants in a cool, dry place, and withhold water; if it is during the summer, place them outdoors in a shaded place and give no water, for they will get sufficient from the summer rains to keep the wood from shrivelling too much.

Many people do not care to carry their fuchsias over from year to year, but I always do, drying them off during the summer and starting them into growth again in September. When starting into growth old plants which have been resting knock the plants out of the pots, shake out from among the roots as much of the old soil as possible, and replace in the same pots with new, rich soil. Keep the plants in a rather humid atmosphere, but do not give much water until the roots have taken hold of the new soil and growth begins to break. At the time of repotting cut back, leaving only an inch or two of the last season's growth. This is done to keep the plants small and compact.

AN EASY FAVOURITE

Another plant which will give much pleasure, and which is as easily grown as either

the geranium or the fuchsia, is the so-called flowering maple (Abutilon). The common species or type is *A. striatum*. The leaves are thin, dark green, about three inches across, five-parted, and very closely resemble the leaf of a maple. The plant will remain in bloom all winter. The flowers are rather odd and very attractive. They are bell-shaped, about an inch and a half across, borne on long, drooping pedicles, and are red or orange, marked with many brownish-red veins. The stamens are borne in a large bunch on the end of a column which is as long as the petals. A larger, stronger-growing kind is *A. Thompsoni*, in which the leaves are only three-parted, and mottled with lighter green and yellow. The flowers are yellow or orange, with red veins.

In addition to these there are many named kinds in the trade, the most common of which are Savitzii and Souvenir de Bonn. They are used chiefly as bedding plants in the summer, but may be grown for foliage during the winter. Species can be grown readily from seed, but it is hardly worth the trouble, because they are so easily increased by green-wood cuttings taken at any time of the year.

The best results, however, will be had from spring struck cuttings. The abutilon is so easily grown that the old plants may be thrown away as soon as they get ungainly, and new plants started. They can be kept small enough for the window, however, if occasionally cut back.

The best yellow-flowered plant for early winter bloom is the yellow flax (*Reinwardtia trigyna*, but almost always spoken of among gardeners as *Linum trigynum*). The plants grow nine inches to a foot high, and are quite symmetrical. The bright yellow flowers are from one to one and a quarter inches across, and stand out in sharp contrast against the beautiful dark green foliage.

The yellow flax is not a difficult plant to grow if one can give it a night temperature of 55 or 60 degrees, and lots of sunlight; it will not succeed in windows having but few or no direct rays from the sun. If you wish to grow your own plants, it is easily done. They can be raised from seed, or from cuttings. Make cuttings from the growths which start from the base of the plants; cuttings taken from top growths have a tendency to flower prematurely.

Do this in the late winter or early spring, when the plants are through flowering, and plant them out during the summer. Such plants will be large enough for a five or six inch pot in late August or early September. When lifting the yellow flax, be very careful as it resents much disturbance of the roots.

SOME UNUSUAL BULBS

No window garden would be complete without some bulbous plants like amaryllis, calla, etc. The common calla (*Richardia Africana*) has been a favourite house plant for years, but, unfortunately, it has not always bloomed satisfactorily. The calla is a gross feeder, so needs rich soil. Let it contain, if possible, about one-third of well-rotted horse manure and the balance of rotted sod with enough sand to make good drainage. I believe it is the summer treatment of the bulbs which, to a large degree, determines whether the plants will flower or not. If water is withheld from them, the pots laid over on their sides in a dry, shaded place, so that the bulbs may rest, amateurs will have no trouble about non-flowering during the winter. Start the bulbs

into growth in September. At first give them one good watering (which will be sufficient until the roots have started growth), and place the pots in a warm window. Until the plants are in good growth, water sparingly; after that, copious amounts of water will be needed until late in the following spring or early summer, when the bulbs are to be dried off again. The Little Gem calla is a dwarf form — twelve to sixteen inches high — which is well worth cultivation in the window.

There are several kinds of calla in the trade besides the common one. The best of these is the golden calla (*Richardia Elliottiana*), a summer blooming kind. Keep the bulbs over winter in a cellar, or other convenient place, in a temperature of 45 degrees. In April pot into rich soil and give a watering. For the following week or two they can be left in any cool, dark place, such as in the cellar, or under a bench, until the roots have started. Having once started, the plants will make a rapid growth and come into bloom in ten or twelve weeks. The habit is the same as that of the common calla. The foliage is a rich,

dark green. The plants produce seed quite freely.

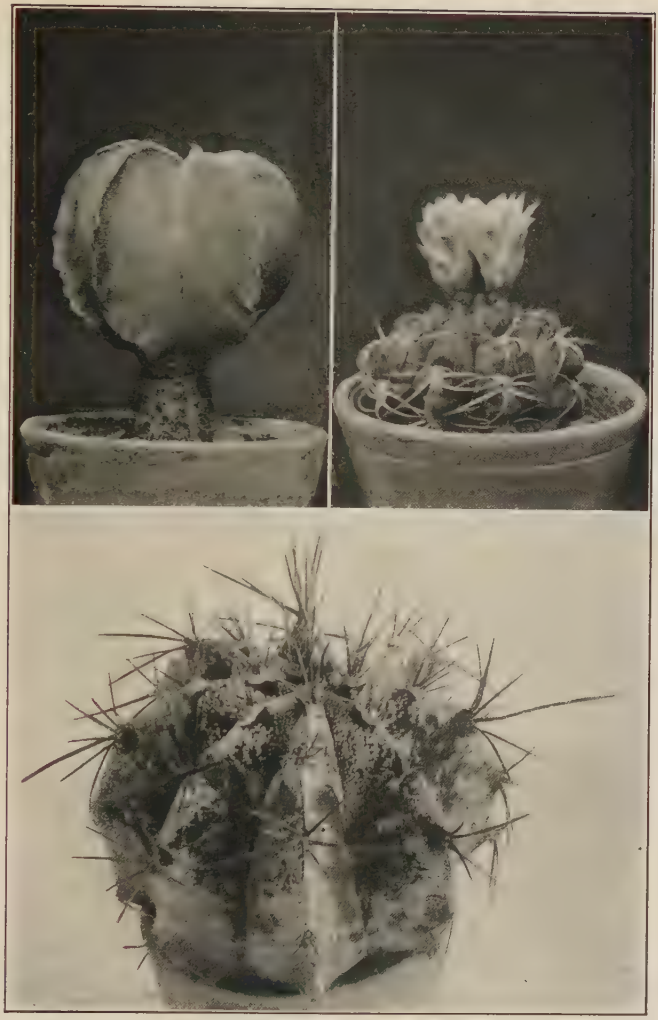
Another very popular bulbous plant is the amaryllis, or rather the hippeastrum. The most popular, and the one that will best withstand the conditions of house culture, is Johnsoni, a garden hybrid. This has been cross-fertilized times innumerable, so that now one may secure varieties in almost any shade of red. The lily-like trumpets are four to five inches across, and are borne on stems eighteen inches to two feet high. The best named varieties arrive from abroad in November. They cannot be secured before because the bulbs must be thoroughly ripened before shipping. Very good American grown bulbs can be secured about a month earlier, however.

As soon as received pot the bulbs in a good soil composed of three parts rotted sod, two parts well-decayed horse manure, and one part of sand. Allow the bulbs to lie dormant until along in January, when, if they are good, strong bulbs, they will flower. As soon as the flower bud is seen emerging from the bulb put the plant in a window where it can get plenty of sunlight and water.

The plants flower before much leaf-growth is made, that developing after the flowering season. During the period of growth water the soil once or twice a week with manure water. When all danger of frost is past plunge the potted plants outdoors in coal ashes, soil, or anything else handy, to prevent the rapid evaporation of water through the pots. When the leaves begin to turn yellow it is a sign that the bulbs are ripening. Then gradually withhold water and when they are ripe store them in a cool, dry place until the flower scapes begin to push out of the soil the following winter.

THE BLUE AFRICAN LILY

Agapanthus umbellatus has many long, narrow, dark leaves, from among which rises a stem two or three feet high, bearing a large umbel of very handsome blue flowers. Unlike the amaryllis, it flowers with its leaves, which adds to its beauty. The easiest way to handle it is to grow it in pots or tubs which are stored in a light cellar or other dry place during the winter. During the resting period give the plant just enough water to prevent the leaves from falling. In the



SOME GOOD CACTUSES

These are the best plants for crowded quarters because they never demand much space. 1. The bishop's cap (*Echinocactus myriostigma*); 2. Another Echinocactus with characteristic spines; 3. A dwarf-growing Echinocactus (*E. ornatus*)

THE SHOWIEST HOUSE CACTUS

The crab cactus has gorgeous crimson flowers in winter time. *Epiphyllum truncatum*

spring, when danger of frost is past, the plants are put outdoors to flower and make their growth.

The agapanthus is, however, easily forced into bloom at other seasons of the year, for the flowering season is controlled by the resting period. The earlier you wish it to flower, the earlier you dry it off; and then it does not have to rest all winter if the growth was made outdoors the previous summer, for it can be brought into the window after the turn of the year, and started into growth. When once established, the plants need not be repotted for several years if they are fed with manure water during the period of growth. The blood flower (Hæmanthus) requires the same treatment.

AN EVERGREEN BULB

Clivia (*C. miniata*, or *Imantophyllum miniatum*) is an evergreen bulbous plant, well worth growing for the beauty of its dark green foliage. It flowers during the spring or early summer months. The flowers are funnel-shaped, as in the amaryllis, and are bright red with a yellow throat, and about three inches across. Pot in a strong, well-

drained soil, which will not wear out for a couple of years, and which will not become sodden or sour; for it is not necessary to repot it each year. During the winter store the Clivia in a light, cool place, the temperature of which does not go below 40 degrees; under such conditions it needs but little water.

Some other plants which the window gardener can grow with comparative ease, and from which a great deal of pleasure can be had, are:

Shrubs: *Acacia armata*, flowers yellow; succeeds under the same treatment as is given azaleas. Chinese hibiscus (*H. Rosa-Sinensis*), flowers red; but there are several varieties the colourings of which vary to salmon and pink. Sweet olive (*Osmanthus fragrans*, but known in the trade as *Olea fragrans*), very small white flowers which emit a very delightful odour. *Swainsona galegifolia*, and its varieties *albiflora* and *violacea;* flowers red, white, or rose-violet respectively.

Herbaceous plants: Lantana, *Strobilanthes anisophyllus*, and coral plant (*Russelia juncea*), which is good for edging boxes, etc.

Vines: *Clerodendron Balfouri;* Maylayan

jasmine (*Rhynchospermum jasminoides*); Potato vine (*Solanum jasminoides*); *Stephanotis floribunda*, and the Wax plant (*Hoya carnosa*).

Annuals to be grown from seeds or cuttings each year: Monkey flower (*Mimulus tigrinus*); stocks, wallflower (*Cheiranthus Cheiri*); sensitive plant (*Mimosa pudica*).

For summer flowers in the house grow tuberous rooted begonias. These must be started in March, and in September, when the bulbs have ripened, store in a cool, dry place.

A word of encouragement may be wise here: While the soil recommendations given in the preceding pages are sound, and desirable for the best results, still the plant lover need not forego the pleasure of his favourites because the exact conditions cannot be supplied. With intelligent care and loving attention much is often accomplished with very ordinary soils indeed. Therefore I say, try with the best approach to the ideal that you can have.

CHAPTER X

Roses, Carnations, and Chrysanthemums

The three most popular flowers — Forcing for winter bloom — Propagating carnations from cuttings — Putting outdoors for summer — Varieties that are best for the window garden.

There is no necessity for the existence of the small, sickly, rose bushes that it has been my lot to see in so many homes that I have visited; bushes that are struggling to merely exist. Properly handled, roses in the window garden will give a good crop of flowers during the early months of the year, at least.

One way to accomplish this is to have the plants growing outdoors during the summer, digging them up early in November, potting and forcing into bloom. While this works fairly well, and will do for those who have not made better preparation for the winter's flowers, the better way is to grow the plants in pots or boxes all summer long.

WHAT ROSES TO GROW

Some of the best varieties for growing in boxes are Anchen Muller (Pink Baby Rambler), Mme. Norbert Levavasseur (Baby Rambler), Clothilde Soupert, Dorothy Perkins, Gruss an Teplitz, American Pillar Maman Cochet, Papa Gontier, Safrano, White Maman Cochet.

Get these as early in the spring as the nurseryman will ship them to you, and plant them in boxes. A convenient-sized box will be about three feet long, eight to ten inches deep, and about fifteen inches wide. Such a box will fit into a window very nicely, but must be held in place by a bracket. I would not advise using a box of smaller size as it will dry out too quickly, necessitating very frequent watering, a very unfavourable condition for plant growth.

Have several one-inch holes in the bottom of the box so that the surplus water may drain away. To keep it from dropping on the floor keep a tin or galvanized tray under it. There must be an air space (one inch) under the box to allow a circulation of air. In the bottom of the box put a

one-inch layer of drainage — gravel or coal clinkers will do — and fill the box with soil for planting.

Roses prefer a heavy soil, one composed of three or four parts rotted sod to one of manure will be satisfactory.

THE PLANTS TO BUY

Buy two-year-old plants. Put about three plants to a box, and plant them as deeply as the boxes will allow; and if the roses are budded, get the union between stock and cion three inches below the surface, if possible. Cut the canes back to within six inches of the ground.

Until the plants have taken hold of the new soil, keep the boxes in a shaded place, then remove them to full sunlight. Never allow the soil to become dry, and as soon as the boxes have become well filled with roots water the plants once or twice a week with manure water. In the fall, when the leaves begin to drop, give the soil less water, and when the leaves have all dropped, or the last of them are just about to drop, stop watering until you are ready for forcing, which will be about the turn of the year.

The roses may be stored almost anywhere in a cool place. Some freezing will not hurt them; in fact, it will help to put the plants in good condition.

BEGINNING TO FORCE

About the first of the year cut back the canes about half, place the boxes in the window of the living room, and in a couple of months or so the plants will have plenty of good flowers.

After the flowering season is over put the plants outdoors if all danger of frost is past, remove some of the top soil and top dress with new soil, and get them ready for another winter's forcing. I would not force them more than two winters, however; after that, throw away the plants and start afresh.

STARTING CARNATIONS

Another excellent plant for the window garden is the carnation. Along in May procure from your neighbouring florist cuttings which have become established in two or three inch pots, and which have not become pot bound. If they are healthy it will make no difference if they look rather lank

or leggy, because about the first thing to do will be to pinch them back — pinch out the tops. If the plants are put in the garden before all danger of frost is past they will not be injured if they have been properly hardened off.

During the summer grow the plants out of doors. Select a well-drained portion of the garden, spade it as deeply as possible with a spading fork, turning under at the same time a dressing of well-decomposed manure which has been spread on the ground about three inches thick. After spading thoroughly, rake the soil until it is fine and smooth, and all the stones have been removed. Set the plants eighteen inches apart, in rows which are eighteen to twenty-four inches apart. Cultivate the ground thoroughly all summer long. I have found it an excellent scheme to go over the garden about once in two weeks, loosening up the soil with a spading fork, to a depth of about three inches.

Water freely all summer, do not give them a little sprinkling every day, which will do more harm than good — give them a thorough soaking once or twice a week, after which the surface soil must be stirred with a

wheel hoe, or other tool, to form a soil mulch, to prevent the evaporation of moisture. I had a plot about 100 feet square, of sandy soil, with a gravelly subsoil, so there was no danger of overwatering. This little garden plot held a miscellaneous collection of plants which were grown for potting up in the late summer, for winter flowers, and on this plot a hose ran every day. Some part of the garden had a thorough soaking each day, and each part had a watering about twice a week, so you can see that if your ground is well drained, you need not have any fear of over-watering your plants or garden.

As soon as the plants start to grow, pinch out the top. This is easily done with the thumb and forefinger. This pinching should continue all summer, at intervals of ten days or two weeks, or when the new shoots which start as a result of the pinching have made about an inch or an inch and a half of growth. Be careful to note the difference between the leaves and stems. The new leaves frequently stick out straight and round, like a stem.

This constant pinching will secure round, stocky plants, six or eight inches in diameter.

If the plants are allowed to run up to a single stem, and then to flower, they will be of little use for next winter.

LIFTING AND POTTING

About the middle of August is a good time to transplant the plants into pots and boxes — their permanent quarters for next winter. If you have a small greenhouse, and want to plant them out on a bench, this is the time to do it.

As a general rule people soak the ground just before lifting the plants, or do this work after a rain. I have found the contrary to be good practice. I got much better results from allowing ground to dry out a little. This however, cannot always be done on heavy soil, nor will it work properly unless the soil is full of humus, but on my sandy soil it gave me great, long feeding roots, which I otherwise would have lost.

Plants grown as I have described will need pots six or seven inches in diameter — they may be put in boxes, or on benches, and planted a foot apart.

Do not "over-pot" them. When you are putting them in the sized pots mentioned

you will feel that you are crowding them, but you forget that the new soil which you are putting around them is full of plant food, so that they will not need to have a large amount of soil in which to forage.

I found that a soil consisting of equal parts of rotted sod, leafmould, well-decomposed horse manure, and sand, made a good medium in which to grow the plants. If you can mix up your soil a week in advance, put in a five-inch pot full of bone meal to a wheelbarrowful of soil. This must be done beforehand, as it ferments, which would hurt the roots if it were added just before potting the plants in it.

Be sure that the roots are spread out as much as possible, and that the soil is worked in well among the roots. This can be done by filling up the pot, and then holding the plant by the stem, gently lifting it up and down. You will be surprised to find how much soil will work in around the roots which you could not get in there by any other method.

Firm — do not pack — the soil, first with the hands, and then with a potting stick. This stick should be a piece of white pine,

because it is soft; about a foot long, an inch to an inch and a half wide, and about three-quarters of an inch thick, rounded at the ends and the corners smoothed off, so as not to hurt the hands.

CARE AFTER POTTING

When potted, water the plants, giving them enough so that all the soil in the pots is thoroughly moistened, and set them in a shady place for a few days, where they are sheltered from the wind. The watering will help settle soil among the roots. In order to help the plants recover from the shock of transplanting, syringe the foliage three or four times a day, doing it early in the morning and late in the afternoon, with a couple of syringings in the middle of the day. Take care, however, not to give them so much water that the soil in the pots will be kept very wet, because if you do the soil will sour. Great care must be exercised to keep the soil moist but not water-logged. At this time the plants are forming new working roots, so they can take only a small quantity of water from the soil.

In a couple of weeks when the new roots

will have commenced to form and to work, the plants should be gradually brought into the positions more exposed to the sun. When the plants are first potted, they will wilt somewhat during the day, but so long as they have a fresh, bright, crisp appearance each morning, you need have no fear of losing them.

When the plants have become established they may be brought into the house, or they may be set in a deep coldframe, or any other place where they can be easily cared for, have plenty of sunlight, and be protected from the cold nights.

I do not now recall the names of those which I grew, and, moreover, varieties of carnation come and go rapidly, but it is desirable to choose compact growing, free blooming kinds: Enchantress, pale pink; Mrs. Nelson, deep pink; May Naylor, white; Boston Market, white; Portia, scarlet; Eldorado, yellow, were good typical kinds of their day.

CHRYSANTHEMUMS NEED THE SAME CARE

I have described how I grew my carnations. In this same plot of ground I always

had a lot of chrysanthemums. They were plants which were started in the spring, and were large enough so that some of them were in five-inch pots when I planted them out late in May, sometimes before the last frosts, which will not injure them. They were given the same treatment as were the carnations, except the pinching out of the ends of the shoots. This was done regularly; every day or two the plants were looked over, the ends of some of the shoots being pinched out. As a rule, I usually allowed a new shoot to make about two inches of stem before stopping it, but varied it, as was necessary, in order to secure a symmetrical plant. Pinching out the ends of the shoots must stop not later than the first of August. Some of the professional growers do not stop the shoots after the middle of July.

Plants given the treatment described will need pots from eight to ten inches in diameter, with possibly a few exceptions, when eleven and twelve inch sizes may be needed — never larger than that. Soap boxes will make very good receptacles for them, and they are much the cheaper, as several boxes

can be got from the grocer for the price of one pot. Provide good drainage by making four or five holes in the bottom of the box and putting in a layer one or two inches deep of stones or clinkers.

After lifting and potting put the plants in a shaded place. They will wilt more or less during the day, but as long as they are fresh looking each morning you need have no fear of losing them. Syringe the foliage frequently during the day, but after the first watering given at the time of potting do not water the soil until the plants have taken hold of it. The syringing of the foliage will provide enough moisture for the soil.

The plants may stay outdoors until the cool nights of fall come, then put them in the house where they are to flower. When the pots are again full of roots give manure water once or twice a week until the buds commence to show colour.

Keep the plants clean by syringing with tobacco water or fumigating; the black aphis is very fond of chrysanthemums.

After flowering, cut the plants to near the ground, and store the boxes in a light, cool

place until next February or March, when cuttings can be made from the suckers. These will make good plants for the succeeding fall's flowers.

CHAPTER XI

Cactuses and Other Succulents

Plants for the busy man or woman — Their remarkably resistant powers — Accommodation to small spaces — Their peculiar merits described — Raising from seed — Making plants from cuttings — Watering and the rot disease.

For the man or woman who has only a few odd minutes to spare at irregular intervals for plant cultivation the cactuses and some of the succulents will give the greatest amount of satisfaction. Unlike most other window plants they do not greatly resent irregularities in watering. They have no tender foliage to get damaged, or to fall if conditions become unduly bad; and they require less attention in the matter of repotting into larger-sized receptacles than any other class of plants. Their slow rate of growth is a positive advantage for the window gardener, as a remarkably large assortment can be kept in the same quarters for a number of years without becoming unduly crowded.

With very few exceptions indeed cactuses are not grown for their flowers, but when these do appear they are every bit as gorgeous as many of the better known flowering plants, and often indeed, with their intensely glowing ruby and purple shades, they rival even the most showy of the orchids. The flowers are also very large in comparison with the plants, and it is no unusual thing to see a little plant three or four inches high in a pot a trifle smaller, carrying two or three flowers, each one of which is of almost the same size as the parent stock.

Cactuses offer untold opportunities for "house gardens." Unfortunates who are confined to city apartments, and whose only opportunity to keep growing plants is confined to the living rooms or shelves in the window, can easily accommodate two or three dozen cactuses where there would hardly be space for one good-sized Boston fern or a couple of starved geraniums. The little plants are never in the way, and can be shifted about easily as necessity demands; and though, of course, hard usage is most undesirable, they will survive the hundred and one accidents and strains upon their vitality that would be

fatal to any other living thing. Though the cat may jump and knock them down with such persistent regularity that the plants are tumbled out of their pots every few weeks, they will still remain alive. I do not advocate such maltreatment and neglect; cactuses, like everything else, will give amazing returns for attention that is just a little bit better than the ordinary, and there is a great personal satisfaction in being the possessor of something a little better than your friends.

The only way to get flawless specimens is to grow the plants yourself from seed, and the process is simplicity itself. (See page 166.) You can begin at any time of year, with the absolute confidence of producing plants of appreciable size in twelve months of such genera as Cereus and Opuntia. Plants that have been collected in the wild will never present the same even texture of surface and bright green colour, nor will they attain equal rapidity of growth or live so long as plants raised in cultivation, because their roots are damaged in the removal.

For the purpose of the window gardener cactuses may be grouped into these general classes: (1) Tall; (2) Dwarf; (3) Vine-like.

In the first class are the Indian figs and some species of the genus Cereus, but I would hardly recommend them for the window garden, because they soon get so tall that they are top heavy, and frequently tumble over.

GOOD TALL PLANTS

Only two of the tall growing kinds need be included in the amateur's window collection. The Indian figs (Opuntia) have flat, round or club-shaped stems, but they are usually flat, and the joints either round or oblong in shape. The rather large flowers are borne singly on the upper edges of the young growths, and are showy, the usual colour being yellow, but they may also be found in various shades of red. One of the best of this type to grow is *O. microdasys*, with flowers two inches across, and greenish yellow in colour.

A very interesting one, but more difficult to grow, is the dwarf prickly pear (*O. crinifera* also known as *O. senilis*). Instead of spines, it has long, silky white hairs, and must be grown under a bell glass, if the hairs are to be kept clean. It never attains a height of more than about three feet.

In Mexico the organ cactus (*Cereus marginatus*, also known as *C. gemmatus*) is used for hedges or fences. It is distinct in appearance from others of its genus. The stem is seldom over three inches in diameter, with five or six very obtuse ridges, each of which has a row of short, black spines, which grow in bunches of seven to nine. This can be successfully grown in the house too.

RED FLOWERS ALL WINTER

The commonest cactus in the window garden, because it gives such a wealth of bright flowers, is the crab cactus (*Epiphyllum truncatum*). In its native country it is an epiphyte, but it can be grown successfully on its own roots in soil. The best way, however, is to have a plant grafted on Pereskia. The young stems are flat, resembling the claws of a crab, but they become round and woody with age. During the winter each tip produces a pair of brilliant flowers, ruby-red, or varying toward violet-red, according to the variety. In Europe there are many named varieties. It is useful in suspended pots, or baskets, the long stems hanging over the edges of the pots. It flowers in the winter. Grow in a soil

made of equal parts of fibrous loam, leaf-mould, and sand, with some finely broken charcoal or broken brick, for drainage.

Another red flowered plant (but blooming in June) is *Phyllocactus Ackermanni*. Its big flowers (four to six inches in diameter are like those of the night-blooming cereus, (and it is grown in the same way) but they are scarlet-red outside and carmine-red inside. It has flat stems, and grows only about three feet high.

THE NIGHT-BLOOMING CEREUS TANGLE

The most popular of the vine-like cactuses are several quite distinct plants, but all popularly known as "night-blooming cereus." Two genera are confused under this name — Cereus and Phyllocactus. They make long, straggly stems, which may be trained up along the window cases or over trellises. The stems of Cereus have three to six angles, while Phyllocactus stems are flat, the ends looking like long, fleshy oak leaves. All the cereus and the night-blooming phyllocactus have large white flowers. They expand just after sundown, and remain open until the sun shines upon

them the following morning, when they collapse.

These plants need a richer soil than the ordinary run of cactus. Give them a fibrous compost, and mix some broken charcoal with it, to insure good drainage.

A HANDFUL OF DWARF PLANTS

Regarded purely as window garden plants the dwarf species — growing to about a foot, or less — are the most desirable. They possess a great variety of queer forms, and some are most viciously spiny.

One of the most peculiarly shaped is the "bishop's cap" (*Echinocactus myriostigma*, also known as *Astrophytum myriostigma*). The outline of this plant is that of a flattened globe, and at the most is only about five inches in diameter. It has five or six very prominent ribs, on the edges of which the pale yellow flowers are borne. The surface of the plant is more or less covered with a white scale-like growth (clusters of minute spines), which reminds one of scale insects. This plant seems particularly prone to rot at the surface of the soil, to avoid which it can be grafted on a cereus.

Of the same general type is the sea-urchin cactus (Echinopsis). If it were not for the ridges these plants would look like gourds standing on their small ends. They sometimes reach a diameter of twelve inches, but as grown in the window garden, rarely exceed half that size. The stem has anywhere from a dozen to eighteen sharp ridges. The flowers are about six inches long, trumpet-shaped, and either red, pink, or white. The two most commonly grown species are *E. multiplex*, with rose-red flowers, but blooming seldom, and *E. Eyriesii*, which has white flowers produced freely.

One of the most curious is the living rock cactus (*Anhalonium Engelmanni*, known in the trade as *A. fissuratum*), sometimes also called "dry whiskey," because a very strong, intoxicating drink is made by crushing the plant and adding a little water.

Among the very smallest are the mammillarias, seldom growing over six inches high. They get their name because they are covered with tubercles, instead of ridges. These are usually set in rows which twist spirally around the plants. On the end of each tubercle is a cluster of small spines. The

flowers are small and tubular, yellow, red, carmine, or purple. In a month or two after the flowers have disappeared a little red fruit appears, and is far prettier than the flower. *Mammillaria bicolor* is a very handsome species, with white spines which lie flat on the stem. In *M. plumosa* and *M. lasiacantha* the spines are like fine white hairs. When grown under tumblers, to keep the dust from collecting and soiling the hairs, the plants look like bolls of cotton.

The "old man" cactus (*Pilocereus senilis*) is another one of those curious fuzzy cactuses needing protection from dust. The hairs are from two to five inches long. The flowers, which are seldom produced in cultivation, are four inches long, and red. In a pot this plant rarely exceeds a foot in height, although it becomes a veritable tree in its native haunts.

THE CENTURY PLANT

Some other desert plants which are not cactuses, but needing practically the same treatment, are usually associated with them naturally.

Probably the most talked-of among these

"succulent plants" is the so-called century plant (*Agave Americana*), from the supposition that it blooms but once in a century. It seldom does bloom in cultivation, but that is because of insufficient pot room which cramps the roots and supplies a meagre amount of plant food. Under favourable conditions the century plant has been made to flower in something like twenty years. To accomplish this an abundance of plant food and water was supplied. Although this, as well as all the other agaves, come from the arid portions of south-western United States and Mexico where they have a strenuous struggle for existence, they will promptly respond to good treatment.

The century plant is very useful to the amateur. If he does not care for it in the living room it can be grown in a tub and set on or in the lawn during the summer and stored during the cool months of the year in a rather light but frost-proof cellar. Stored thus, it will require but little water during the winter.

Small plants can be grown all winter in the living room, and when warm weather comes they may be used for porch decoration.

The century plants are well adapted for this because of their symmetrical habit. A large century plant will have forty or fifty fleshy leaves, each about three or four feet long and three to four inches across, which gradually taper to a point that is tipped with a very sharp spine; the edges also have a few short spines. They form a large rosette which sits on the ground. The leaves are of a light glaucous green colour in the type, but there are several varieties known as picta, variegata, and recurvata. Some of the varieties have a more or less broad yellowy stripe down through the centre of the leaf, while in others the leaves are edged with yellow.

Should you be so fortunate as to have a plant flower, do not be surprised that it dies as soon as the seeds mature. It always does this, but the plant may be perpetuated by the numerous suckers which will be found about the base of the old plant.

The flowers are borne in clusters at the top of a tall stout stem and have a weird candelabra-like effect.

There are about one hundred and fifty different species of agave, varying in the

size and shape of the leaves, but there is not enough difference between them to pay anyone but a botanist in growing a large collection of them. The only exception to this is the Queen Victoria century plant (*Agave Victoriæ-Reginæ*). The leaves of this are short and thick — so thick that sometimes they appear to be three-sided — with three more or less well-defined edges, having white filaments. The ends of the leaves are blunt but tipped with a short black spine. So closely together and so regularly are the leaves set that they form a hemispherical mass. Where the room is limited this is the best one to grow.

Give century plants a sandy soil and pot them firmly. If they are planted outdoors during the summer, be sure they are in sufficiently large pots so that when taken up in the fall they will not need repotting.

THE ALOES

Next to century plants I believe that the aloes are the most interesting. Although there are a large number of species, only a few are in general cultivation, the most common of which is the Barbadoes aloe (*Aloe*

vera). Strange as it may seem it belongs to the same family as our beautiful Easter lily. The light green leaves are very thick and fleshy and taper gradually to a point which is not tipped with a spine. At a distance the edges look as if they were set with spines, but one is agreeably surprised to find that it is a suggestion only. In the late winter months a flower stem about one and a half or two feet long is produced which bears at its top a conical-shaped cluster of yellow flowers which reminds one of the flower cluster of the red-hot poker plant (Kniphofia), a close relative. The individual flowers are about one and one-quarter inches long, yellow, and crowded closely together. A single flower lasts only a day or two, but the lower ones open first while the buds of the upper ones are still forming so that one plant will be in flower for a fortnight, or so.

If you want a red-flowered aloe grow *A. Succotrina.*

These aloes have one bad habit: when they begin to get of any size they become top-heavy. To overcome this, stake them for several years. If the plant becomes too big for the window garden and yet you do not

wish to dispose of it, use it outdoors during the summer and store it in the cellar over winter as suggested for century plants. Under this treatment, however, flowers are the exception.

The aloes prefer a richer soil than most of the succulents. I have seen them thriving when grown in nothing but garden loam, but I prefer to give them a soil made up of about three parts sandy loam, and one part of old plaster and broken bricks. A little well-decayed manure may also be added with much benefit to the plants.

A GOOD BASKET PLANT

The best succulent for a hanging basket is "little pickles" (*Othonna Capensis*, but almost always called *O. crassifolia* by the florists). Its leaves are shaped like cucumber pickles, but are only an inch or less long. The flowers are yellow, one-half to three-quarters of an inch across and look like dandelion flowers. They only open in the sun but at almost any season of the year each shoot has a flower stalk on the end of it. Little pickles may be increased easily by planting pieces of the stem and does best

when given a fairly rich soil, but be careful not to over water it.

THE OLD-FASHIONED "AIR PLANT"

If you want something interesting to show your friends, grow the so-called air plant (*Bryophyllum calycinum*). The plant itself has no decorative value, but it blooms about once a year. The flowers are reddish green with white spots, are about two inches long and are borne in clusters. The curious thing about this plant is that if a leaf is laid on a damp surface it will produce a new plant at each indentation. I have seen leaves pinned to a wall or window casing in the house produce four or five new plants.

GROTESQUE EUPHORBIAS

For something grotesque, grow one of the euphorbias, and it does not make much difference which one of the fleshy kinds it is; neriifolia and antiquorum are good ones. The stems are green, fleshy and three or four angled. Some kinds, like *E. neriifolia*, have a good crop of leaves; others have but few, in which case they look like bare poles, and some have no leaves at all and are very spiny,

so much so that you look a second time to see whether they do not belong to the cereus tribe of cactuses.

The crown of thorns (*Euphorbia splendens*), is covered with short, stout, sharp spines. The young growth is always covered with leaves and the bright red bracts, surrounding the flowers, are in evidence most of the year. In order to keep the plant within bounds it must be trained on a form.

THE FIG MARIGOLDS

Another class of plants which will prove very interesting indeed, are the fig marigolds (Mesembryanthemum). The leaves of the various species assume very peculiar shapes and the colour varies from a light glaucous green to very dark green. Some of the species flower freely, *e. g.*, tricolorum and Pomeridianum, two annuals.

M. cordifolium, var. *variegatum*, is a half-hardy, variegated form which is well worth growing as an edging for beds in summer or for rockeries.

APICRA, HAWORTHIA, GASTERIA

The apicras, haworthias, and gasterias have curiously shaped leaves. Those of the

latter are usually strap or tongue shaped, four to six inches long, dark green in colour, and covered more or less with small white spots. In all of the gasterias the leaves are produced in two ranks one above the other. In April and May, and sometimes later in the season, a long flower spike is produced on which are scattering red flowers, which are rather interesting but do not make much of a show unless one has a number of plants in flower at the same time, in which case mass them.

The apicras and haworthias have short leaves, one and a half inches long, roundish, tapering to a point and are arranged in spiral form around a central axis which sometimes is three or four inches tall.

COTYLEDON, ECHEVERIA

Another interesting plant which I like to grow is *Cotyledon gibbiflora*, var. *metallica*, but known by the florists as *Echeveria metallica*. It has some curiously shaped flowers which are interesting but not showy. Its interest lies in its beautiful glaucous, purple, obovate-spatulate leaves which are sometimes six inches wide and seven inches

long; also it forms a big rosette. About one plant is enough in a collection. If you wish more, break off a leaf at the joint and put it in sand; in a few weeks a bud will develop at the base. I have, however, seen leaves that failed to make a bud. They continued for three or four years to exist simply as rooted leaves.

A good many cotyledons are used during the summer for carpet bedding, but perhaps the commonest is *C. secunda*, var. *glauca*. This plant is about three inches in diameter and one or two inches high; the flower stalks are always kept pinched out, for the flowers are uninteresting.

SEDUMS AND HOUSE LEEKS

There are a great many sedums and they are very interesting plants too. The showy sedum (*S. spectabile*) and the live-for-ever (*S. Telephium*), are two that are hardy and can be successfully grown outdoors as well as in the house. The commonest sedum, however, is the stonecrop (*S. acre*). This is an evergreen and may be used as a hanging plant for the stems will hang down over the sides of the pot, or it may be used in filling

window boxes. I have seen it used thus and stay outdoors permanently. The leaves are very small (one-quarter of an inch long), but they are crowded closely together on the stems. The foliage is a delightfully bright green and in the variety aureum the shoots are bright golden yellow in the spring; in the variety elegans the tips and young leaves are a pale silvery colour. The sedums are easily propagated by seeds or by the offsets which are freely produced.

The house leeks (Sempervivum) are very similar to the sedums. The commonest ones are the common house leek (*S. tectorum*), and hen-and-chickens (*S. globiferum*). Like the sedums these are best grown in boxes, but the plants must not be allowed to grow too thickly or they will not flower.

The most interesting one and, perhaps, the best for house culture, is the spider-web house leek (*S. arachnoideum*). The leaves, which are short and fat, are borne in rosettes and between the tips of the leaves there are fine, white threads, like a spider's web. The flowers are bright red and borne on stalks three to five inches high.

Like the sedums the house leeks are easily

reproduced by the offsets or even by leaf cutting as suggested for the cotyledon.

CACTUSES FROM SEED, ETC.

To grow cactuses from seed sow the seeds in a well-drained seed soil, and handle them like any other seeds. After germination give less water than for other seedlings, or the young plants will burst, i. e., the skin will crack open, resulting in a scar that is permanent.

Making a cutting of cactus is the easiest thing in the world. Just cut or break off a piece of the plant, and you are done. Since the tissues are so watery, the cut surface must be callused before the cutting is planted. Lay it on a shelf in a sunny situation, where there is a good circulation of air, for a few days.

Such succulents as the aloes, haworthias, apicras and gasterias, may be grown from suckers as well as seeds and cuttings.

Late May and June is best for starting the cuttings, because the wounds will then heal quickly and well. Similarly, collected plants should be received in the early summer, because they are so liable to suffer

A NIGHT BLOOMING CEREUS

As a matter of fact the plant here shown is not a Cereus at all, but a Phyllocactus. The true Cereus has angular, not leaf-like, stems

Epiphyllum Russellianum
Cereus marginatus
Echinopsis multiplex
Opuntia purpurescens
Mesembryanthemum ficoides
Sempervivum tectorum
Euphorbia splendens
Anhalonium fissuratum
Gasteria linguiformis
Opuntia Braziliensis, grafted

EASILY GROWN SUCCULENTS AND CACTUSES

Representative desert plants of easiest cultivation in the window garden. All will survive as low a temperature as 35 degrees, if kept dry

some damage in transit, but will heal quickly in summer.

Collected plants are generally without roots, or they are so badly damaged that they must be removed. Make a clean cut with a sharp knife (always use a sharp knife in gardening), and if the base of the plant is hard and woody, remove that also, because roots will start only from the fresh growing parts. Cut back to the soft, watery tissue, and expose to the sun until the wound has callused. Any diseased or decayed portion of the plants must be cut out; if this does not stop the spread of the trouble, cut it out again, and then cauterize the wound with a hot iron.

THE EASY SOIL PROBLEM

It does not matter much what sort of soil is used so long as it is a well-drained one. That is essential. One successful grower uses equal parts of sandy loam, coal ashes and sand, and advises the improvement of a clayey soil by adding to it a little air-slacked lime. Another, equally successful, uses equal parts of fibrous loam and old lime rubbish (plaster, etc.) from which the fine dust has

been screened, with the addition of some clean, sharp sand.

The succulent plants other than the cactuses can be grown in a much richer soil, but great care must be exercised not to overwater, causing the stems to rot. Seedling succulents may be grown in pots — one to a pot — or in flats with a large number in each one. It is handiest to have the plants in pots. Even the smallest need drainage. A good rule to follow is to fill one-quarter to one-third of the pot with coarse drainage, such as coke, coal clinkers, or broken pots, over which put a little sphagnum moss, to keep the soil from sifting down among the drainage.

When potting up a cactus select a pot just a little larger than the body of the plant. Many people crowd the plant into as small a pot as possible, but I believe this is bad, because the plant needs some space in which to grow, and if the pot is small, it is impossible to water it properly. When potting, put the coarsest part of the soil next to the drainage, with the finer part above it, and around the plant, so inserting it that the bottom (be it rooted

plant or cutting) is only a very little below the surface of the soil. After potting, give a little water, to settle the soil, and no more, ordinarily, until the plant begins to grow. Lightly syringe on all bright days. If the potting is done in early summer, and the plants are plunged outdoors, the water which they receive from the syringing will be sufficient for all their needs until growth begins.

IMPROPER WATERING AND ROT

Too much watering, or too rich and heavy a soil, will cause rotting of the plant at the soil line — the commonest cause of loss in amateur collections. This can only be avoided by watching, and giving water only when the soil becomes dry. When you do water, give enough to thoroughly dampen all the soil in the pot.

WHEN TO REPOT

A properly potted plant will not need shifting for some years, and will do all the better for not having the roots disturbed. If the soil becomes water-logged, or sour (perhaps growing moss), repot at once. Mealy bug sometimes attacks the roots. As

soon as it is detected, shake the soil from the roots, and thoroughly wash them in clean water, repotting in a clean pot and new, clean soil.

INSECTS ON THE STEMS

The most likely insect pests are red spider, thrip, scales, and mealy bug. The two latter are easily brushed off with a small brush, but if the stems are frequently syringed with clear water, soap suds, tobacco water, or a solution of fir tree oil, none of these pests will give serious trouble. The red spider will never appear if watering is frequent enough. The fir tree oil prevents thrips.

Cactuses are not helped by rich feeding. The only exceptions to this rule are old plants of night-blooming cereus, and the crab cactus (Epiphyllum), which occasional waterings with weak manure water (about half the strength used for other plants) will benefit.

IDEAL GROWING CONDITIONS

The ideal place for cactuses in winter is a rather damp greenhouse, but they will thrive

in the window garden, so long as they never get frozen. Try to keep the night temperature about 50 degrees. The drying of the soils under ordinary house conditions makes watering in winter a necessity. Planted out in a greenhouse, their requirements are very much less. The window gardener must remember that although they are desert plants, they do not naturally grow in small pots, exposed to drying draughts of desiccated hot air.

The growth of the plants will be improved if they are put outdoors when all danger of frost is past in early spring. Some people knock them from the pots and set them in the ground, but it is better to plunge them — plant, pot and all — because they are more easily lifted and no damage is done to the roots. Place them in a well-drained border, fully exposed to the sun, and with a free circulation of air.

The opuntia is the most disagreeable of all the cactuses to handle because of the very small brown spines which grow in bunches all over the stem and fruits. These spines are barbed, something like a fish hook, so that when once they are in the flesh it is exceedingly difficult to remove them.

Because of these troublesome spines in the ordinary forms the so-called "spineless" cactus was hailed with great joy, the claim being that it would be a good stock food. There is nothing really new about it, however, as spineless cactuses of various genera are well known to botanists and collectors.

CHAPTER XII

Nine Iron-clad Palms

The best graceful foliage plants that will successfully withstand for long periods the variable temperature, dust, and gas of the ordinary living room.

Among the best all-round house plants, of a purely decorative nature, are the palms. In the sizes best adapted for house culture, the stem is short, but from it arises a cluster of long, slender, arching leaves which are bold and massive, yet, at the same time, light and airy. One great advantage they have over most plants is that they do not need a large amount of direct sunlight; in fact, the light of a north window is sufficient. If for purposes of decoration you wish to put them in a dark corner of the room or in a hall, they can stay there three or four days without injury; but they must then be put back in the light to recuperate, for no green plant can live long without light.

THE CONFUSION OF YOUTH

It is really very hard to give a good description of the individual kinds of palm, because many of them look so much alike. This is particularly true when in the young state; in most of them, the seed leaves show no distinguishing characteristics whatever, the characteristic leaves not being developed until the plants are nearly a year old. Even in some of the older plants, there is not much difference. For instance, until I became fairly well acquainted with palms, I was continually confusing the areca with the kentia and seaforthia. Some hundreds of species make up the host of palms, and there would be endless confusion and disappointment were the amateur to attempt their cultivation in the house. The only ones to be considered are the following.

The best two palms for house culture are the curly palm (*Howea Belmoreana*) and the thatch leaf palm (*Howea Forsteriana*). They are universally known throughout the trade, however, as *Kentia Belmoreana* and *K. Forsteriana*. They might be identified in popular terms as the erect kentia and the spreading kentia. Although very much

alike, Belmoreana can readily be told from Fosteriana by the more upright leaflets, those of Forsteriana have a decidedly, drooping tendency. Moreover, Belmoreana has a dwarfer, more spreading habit than Forsteriana, while the latter is a stronger grower and has broader foliage. As ordinarily seen in the florists' shops, a kentia in a six-inch pot is two to two and one-half feet high and has half a dozen leaves, two-thirds of the leaf consisting of a long, slender gradually tapering, arching stem surmounted by many broad, dark green leaflets set in two rows. Both these palms will succeed where no other palms can be grown.

THE POPULAR FAVOURITE

Probably the Chinese fan palm (*Livistona Chinensis*, but usually spoken of in the trade as *Latania Borbonica*) is the most popular of house palms, and, to my eye, certainly the most beautiful. It does not grow nearly as tall as the kentia, but is much broader. In this palm the leaf stem is as long as the leaf, and for more than half the length of the leaf, its edges are covered with short, stout, sharp spines. The leaf is a foot or

more in diameter, the outer edge being divided into long narrow drooping segments. The foliage is a deep, rich green, and presents a more massive appearance than that of any other palm. This will succeed in any room where the temperature does not go below 45 degrees at night.

I know of one specimen of this which was grown for the last ten years in a north window during the winter and on the porch in the summer. The owner secured it from a florist as a small plant in a six-inch pot and was so successful in the management that the plant grew until it took up so much space in the room as to be actually in the way.

A somewhat stiff, formal, but interesting palm is the so-called ground rattan (*Rhapis flabelliformis*). It is a slow grower and lasts very well indeed in the house. The rhapis seldom grows more than five or six feet high. The stem is three-quarters of an inch to an inch in diameter and covered with a mass of dark brown threads which are the remains of the leaf sheaths. A cluster of very deeply divided dark green leaves is borne on the top of the stem, each of which is about a foot in diameter. The rhapis

differs from most of the palms in that it produces suckers, each of which sends up a stem so that in time the plant will become as broad as it is tall.

The most beautiful dwarf palm in cultivation is *Cocos Weddelliana*, and as a house plant it is extremely popular. The characteristic leaves are developed at a very early stage, and as the plant is a slow grower, it retains its beauty for a long time. The short stem of the *C. Weddelliana* bears numerous gracefully arching leaves which are a foot or more long and three or four inches wide, and remind one of a feather. The leaflets are very slender, and silvery white on the reverse. It is particularly useful for table decoration in fern dishes as a centre piece, small ferns, such as pteris, and selaginella moss being placed about the base.

This is often referred to as the cocoanut palm; that belongs to the same genus, but is quite different, however, in having large broad leaves in the young state.

Although of no value as a house plant, lots of fun may be had from growing the cocoanut palm from seed. To do this, secure a cocoanut with the husk on and

place it on its side in a pot filled with soil. Do not bury more than one-quarter of the nut. The germination is very interesting as a leaf will appear long before there is any sign of a root, which may not develop for a year. The cocoanut is easily injured by too much water; it needs practically none.

ONE THAT NEVER GROWS UP

About the only other palms which succeed in the house are the date palms (*Phœnix Canariensis*, *reclinata*, and *Roebelenii*). These are all very much alike, the chief differences being the habit of growth. *P. Roebelenii* is a real dwarf; the leaves, gracefully curving, are only a foot or so long. It withstands the hardships of house cultivation equally as well as does the kentia and when small is as graceful as *Cocos Weddelliana*. It is perhaps the most costly of all the house palms. *P. rupicola* is probably the hardiest. It seems able to withstand almost any hardship which may be imposed upon it. In the South and in California, *P. Canariensis* is considered the handsomest of all the date palms. The leaves are more slender and graceful than in

the other palms and it is also the fastest growing date palm.

Considerable fun may be had from raising date palms (*P. dactylifera*) from the dates of the grocery stores. The seeds will germinate in a few weeks, but the plant I cannot recommend, it is too stiff and not so graceful as the kinds just named.

THE MOST COMMONLY SOLD

The palm most often sold by the florist is the areca (*Chrysolidocarpus lutescens*, but known in the trade as *Areca lutescens*). This is easily distinguished from the other palms by its golden yellow leaf-stem and also by the little plants which may be seen growing around the base; like the rhapis, the areca sends out underground suckers. The leaflets are flat, long, and narrow, and of a bright glossy green. The areca can be grown successfully in the house, but it requires some care and it will not stand hardships like the other palms already mentioned.

THE SECRETS OF SUCCESS

The plants must not be subjected at any time to sudden changes of temperature,

such as a draught blowing across them from an open window or door; and the sudden falling of the temperature of the room will cause a chill; the leaves then turn brown and possibly they will die in a short time. To recuperate such plants will need a year or so in a greenhouse under the care of a skilful grower.

Palms need lots of water, but the soil must never become water-logged. If plenty of drainage is given in the bottom of the pot, and sand and charcoal added to the soil, there will be no danger of over-watering for the surplus will drain away quickly.

Keep the leaves of the palms clean by passing a damp sponge over the surface each day. If the plants are not too large to handle conveniently, carry them to the sink or bath tub and syringe them with clean water. Be sure to syringe the under side as well as the top, for this will prevent the red spider and the thrips from gaining a foothold on the plants.

RAISING FROM SEED

Palms may be grown from seed in the window garden without any more care than

is ordinarily given to other house plants, except that they need bottom heat and this can be easily given if the suggestions on page 59 are followed.

The first requisite is fresh seed. With few exceptions, seedsmen do not carry palm seed in stock but it may be secured through a few of the larger retail seedsmen and through some of the wholesalers. Place your order with them asking that the seed be shipped to you as soon as received. Not all the species reach the markets at the same time. For instance, Kentia seed arrives twice a year, in January or February and in September or October. Many of the florists prefer the fall shipment to the winter one, as they seem to have better success in germinating the seed. Livistona seed arrives in February; Cocos in January; Areca in April or May; *Phœnix Canariensis* and *P. reclinata* from January to March; and *P. Roebelinii* in January.

Sow the seeds at once upon arrival because they deteriorate very rapidly. A good seed soil for palms may be made from three or four parts of peat, one of rotted sod and one of sand. To this add some finely broken

charcoal — two pounds to a bushel of soil — it will help to keep the soil sweet.

As palms in the young state are very impatient of any meddling with the roots, the window gardener had better sow the seeds in pots. Sink two-inch pots filled with soil in a flat filled with sand and plant the seeds one-quarter to one-half of an inch deep, one to a pot.

When large quantities of palms are being raised from seed, the seeds may be sown thickly in seed pans or flats, which are not over three inches deep, or they may even be sown on a greenhouse bench. There is a disadvantage in so doing, however. The young plants must be transferred to deep two-inch pots as soon as the second leaf is developed. In transplanting, the long tap root is very apt to become injured and the plant will probably die. About 75 per cent. of the injured plants can be saved, however, if the damaged portion of the root is cut off; use a sharp knife and make a clean cut.

The length of time it takes palm seed to germinate varies. Kentia seed usually comes up in about ten weeks but sometimes all the seeds will not germinate for eight or nine

TWO FEATHER-LEAVED PALMS

The upper one is Robelen's date palm, an extremely slow-growing dwarf; excellent for table decoration. The lower is the Cocos, an extremely dainty plant which does better in a rather warmer atmosphere than most others

THE STURDIEST OF THE HOUSE PALMS

The thatch palms, or kentias, have very dark green leaves and are extremely tolerant of poor light and variation of temperature. *Kentia Belmoreana*, shown above, differs from *K. Forsteriana* only in the more erect habit of the leaf

months. Cocos takes about ten weeks if the seed is perfectly fresh — if not, it will take longer; Areca and Livistona will come up in a month and the date palms (Phœnix) require about two months. When the seed is not perfectly fresh, only part will grow. Germination may be helped somewhat by scratching or filing the outer coat of those which have hard shells.

After the young palm plants of any sort have become established in two-inch pots, the culture is simple. They will need, however, a rather high temperature and moist atmosphere for some months to come, after which they may be inured to almost any reasonable hardship.

Do not give the young plants any manure in the soil. A potting soil made up of two parts of peat, one of rich loam such as a rotted sod, and one part of sand will give the best results. Leafmould is too light for palms, but a little may be added to the rotted sod if peat is not available. An addition of charcoal is also advisable, using the same quantity as already advised for the seed soil.

As the plants become older, a little well-decayed horse manure may be added to the

soil with benefit. The best time to repot palms is in the spring or early summer — April to June — before much growth takes place, but they can be shifted at any time up to the first or middle of October without harm. After that date it is unsafe to disturb the roots; disaster is almost sure to follow any meddling with the root system during the winter.

Never overpot palms, for the soil will become soured very easily. A shift of one size at a time is enough. When repotting be very careful not to injure the roots; but if any are injured, cut off the injured portion with a sharp knife, making a clean cut. If the roots have bound up the drainage, get out all that is possible without injury to the roots, and fill the hole up with good soil before putting the plant back into the pot. The new soil must be firmly packed about the old ball. To do this, use a thin potting stick. It is possible, of course, to get the soil too firm but in practice there is not much danger of it.

CHAPTER XIII

Foliage Plants Other Than Palms

Some bold-growing kinds that are the most tolerant of uncongenial conditions — Plants for dark corners, and some charming coloured effects for the window — Fruiting oranges and lemons.

In addition to the palms there are many foliage plants that may be successfully grown in the house. The hardiest of all these is the aspidistra (*A. lurida*). Its tenacity of life is something wonderful. It does not seem to mind the dust and dry air, or the spasmodic watering and insufficient light which seem to be the common lot of most house plants. It has been wintered outdoors at Philadelphia by giving it a heavy mulch of forest leaves. If given a fairly rich soil and plenty of moisture, the aspidistra will make a fairly rapid growth, but it never gets very tall; it broadens out. The simplest way to get new plants is by dividing the old one in the early spring (February), before any growth takes place so

that the young leaves will not be injured, or in August.

The aspidistra has no stem, the leaves coming directly from the rootstock or rhizome. The leaves are from fifteen inches to two feet long. The leaf stem is about one-eighth to one-quarter of an inch in diameter and wiry, and about one-quarter the length of the whole leaf. The blade is from three to five inches wide and very dark green in colour. There is a variegated form of this having white stripes in the leaves. These are, however, almost lost if the plant makes a rapid growth, and in no two leaves on the same plant are they exactly the same.

An almost equally tough plant is the New Zealand hemp (*Sanseviera Zelanica*). Like the aspidistra, the leaves come directly from the rhizome, the plant having no stem. All the leaves stand up straight like so many sticks, are from one to three feet tall and concave. It is attractive only for its colour which is light green with many transverse markings of a grayish white. There are two others, *Sanseviera Guineensi* and *cylindrica*, in cultivation, but are only infrequently met. In the former, the leaves

are flat, dark green, with lighter transverse markings. The leaves of cylindrica, as the name indicates, are round.

THE SAGO PALM

Another plant of a totally different character, but still seemingly indifferent to the dust and gas of the living room is the sago palm (*Cycas revoluta*). It is a very slow grower, so if one buys a small plant he can depend upon it that it will be some years before it becomes too large for house culture.

The cycas has a short stem which is crowned with a whorl of leaves. Only one whorl is produced in a year, but with care the old leaves may be made to persist for two or three years. The foliage is dark green; the individual leaf is long and flat, being composed of a long central stem to which the pinnæ are attached in two rows. When the new leaves come out they unroll just like the fiddle-head fern fronds, and are upright, but as they grow older, they gradually drop, until the following year, when it is time for the new set of leaves to come out, they are horizontal or slightly drooping.

The cycas is of easy culture, and succeeds well in the varying temperature of a living room and almost any well-drained soil. If you want the fun of starting one yourself, buy a dormant stem from the florist. These cost about fifteen cents a pound and may be had in varying sizes, weighing anywhere from two to fifty pounds. When the stems arrive, plant them in as small a pot as possible and keep them in a warm, humid atmosphere until the plants start to grow; after that, a cooler, drier atmosphere will do.

THE UBIQUITOUS RUBBER PLANT

One of the most popular of all the plants for house culture is the rubber plant (*Ficus elastica*). It is usually grown as a single stem plant and in this shape is very pretty indeed for formal effects, but equally decorative specimens can be had by growing compact, branching plants. The leaves are anywhere from three to twelve inches long, about one-third as wide as they are long, and oblong to elliptical in shape with a small, abrupt point. The upper side of the leaf is very glossy and dark green, but the under side is dull and light green.

Compared with the palms, the rubber plant is a fast growing subject, but a plant grown to a single stem will not become too tall for the living room for a couple or three years. A rubber plant six to eight feet tall always has a "leggy" look, for, as a rule, the bottom leaves drop off. When a rubber plant gets too tall for the house, don't cut off the top and throw it away, but root it, making a new plant as has been described on page 67.

If you have a greenhouse or a propagating box in which bottom heat and a humid atmosphere can be maintained, the stem can be cut up into short pieces — one leaf to a piece. The cuttings can then be put directly into the propagating box or the cuttings tied to small sticks so as to maintain the leaf in an upright position, and the whole planted in sand in two, or two and one-half inch pots and then plunged in a cutting bench. In order to make the cuttings root, a steady heat and humidity in the atmosphere must be maintained.

The rubber plant is a gross feeder so there is no danger of getting the soil too rich. Use an ordinary potting soil such as has

already been described in the chapter on soils, and when the pot has become filled with roots, manure water, or other plant food in liquid form may be given once or twice a week.

During the summer the rubber plant will receive much benefit from being put outdoors, but if the plant has grown much in the house, do not put it where it will get the full sunshine for the leaves will be burned. Place them where they will get the early morning and late afternoon sun, but be shaded during the middle of the day.

With recent years, there has been introduced into general cultivation another rubber tree, *Ficus pandurata*, which is as hardy as the one already described. It differs from elastica in the shape of its leaves which are fiddle-shaped and much broader, being lined also with creamy-white veins.

THE BEST FORMAL PLANT

There is only one member of the pine family which can safely be recommended for house cultivation. This is the Norfolk Island pine (*Araucaria excelsa*), a plant familiar to all. The foliage is a bright

grass-green and the branches are produced in regular whorls of five at short but regular intervals, making a very pretty and symmetrical plant. It is one of the most popular house plants and is the best formal plant for house decoration. The Norfolk Island pine will stand a great deal of neglect, so long as it is in a cool place and the soil about its roots kept moist.

One of the easiest grown foliage plants is the canna; of course it will flower, but, primarily, when grown in the window garden it is a foliage plant. The best one to grow is Black Beauty. Outdoors, this canna grows five to six feet high but in pot culture, it will reach only two or three feet in height. The leaves are rich, glistening, bronzy purple, shaded black and the margins of the leaves are crimped or wavy. The flowers are small and not to be considered in house culture. The bulbs can be bought from the seedsmen, but an easier way is to dig up the bulbs which have flowered in the garden during the summer, dry them off and then pot them up in six or seven inch pots and start them growing. The plant will make a good show all winter

and may be put outdoors in the flower bed again in the summer.

ALL THE SCREW PINES

The most popular variegated plant for house culture is the variegated screw pine (*Pandanus Veitchii*). The leaves grow two to three feet long, one and one-half to two inches broad, are light shiny green with broad pure white stripes and arch gracefully. Both the edges and the midrib of the leaf are thick, and set with spines. When small, it is very useful in fern dishes as a centre-piece; small ferns and selaginellas being used about the base. To be successful with this in the house, one must get plants which have been hardened off. Soft, sappy specimens are very apt to rot. Give the screw pine a rich but well-drained soil and plenty of water, but do not over water. As the roots are rather large and fleshy, the soil must not be packed around them too tightly or their growth will be retarded.

As the plant suckers freely, new ones can easily be made by removing the suckers and treating them as cuttings. There is another variegated pandanus of more recent

introduction, *P. Sanderi*, in which the stripes instead of white are yellow, and during the winter months the new growth in the centre of the plant is a deep golden hue.

Not as pretty but just as hardy is the ordinary screw pine (*Pandanus utilis*). This is a stronger grower than Veitchii; I have seen specimens twenty feet high in greenhouses. The leaves are produced in a spiral, from which it gets its name "screw" pine, are light green in colour and the edges and midrib set with spines as in Veitchii. If you cannot get Veitchii, get this one — and it does not cost as much either because it is much easier to propagate as it is easily grown from seeds.

One curious thing about the pandanuses is the stilted effect they give. This is particularly true of utilis. When the plant begins to attain any size it produces from the stems near the ground large thick roots which immediately penetrate the soil. So many of these are made that the plants look as if they were standing on stilts. All the pandanuses are more or less subject to "spot," which is caused by small insects burrowing under the epidermis of the leaf. There

seems to be no remedy for this, so if your plant becomes badly infested, throw it away. If there are only one or two spots, cut off the infected leaves and burn them; keep the plant dry — do not syringe the leaves — and water the soil sparingly. Over watering seems to induce an attack of this insect.

FRUITING ORANGES AND LEMONS

It seems to be the delight of a great many people to grow an orange or a lemon tree. They save the seeds from fruit used about the house and plant — usually they stick them in a pot with another plant — a bad habit. The seeds grow and after a year or two, a nice little tree has been produced and if the plant is grown long enough, it will produce some fruit, usually sour. I have been asked a great many times how those plants can be made to bear sweet oranges or good lemons. The plants should have been budded with a good variety when about the size of a lead pencil. This requires a delicate operation and the very bothersome detail of sending to some California or Florida dealer for a bud-stick of a good variety.

A much better plan is to buy an Otaheite orange from the florist. The fruit is small and of no value for food, but the plants are dwarf — they grow only fifteen to eighteen inches high — and a well-grown specimen is usually covered with reddish orange coloured fruit. The flowers are pinkish in colour. Even if the plant has no fruit, the deep green of its foliage is always attractive. These little orange plants seem to stand the wear and tear of house culture most satisfactorily.

If a lemon is more to your taste, get the American Wonder or Ponderosa lemon. That is the one which most of the florists are handling nowadays. It is a rapid grower and bears large, white flowers which sometimes are as big as a tuberose, and they are as fragrant as orange blossoms.

Although I have never eaten it, the fruit, which is large, — sometimes weighing one and one-half to two pounds — is said to be good for domestic use. The plant itself without fruit or flower is worthy of a place in the window garden on account of its deep green foliage and fairly symmetrical habit.

FOR COLOURED FOLIAGE

The best small decorative plant for the window garden is the rex begonia. The plants seldom grow more than six inches high; the leaves come directly from the rhizome and are obliquely heart-shaped and all face one way. They are six to eight inches long and of a rich metallic green with a silver band. The original species has been crossed with other species, so that now one can get a variety of shades of green and many different markings. If the window garden is large enough, space should be given to three or four different varieties as they will be a source of much pleasure. Their culture is easy; they delight in a rich soil to which a large portion of leafmould has been added.

I believe that the best specimens of the leopard plant or farfugium (*Senecio Kæmpferi*, var. *aureo maculatus*) I have ever seen have been in window gardens. There is something about them which is always attractive to me. The leopard plant has large leaves — six to ten inches across — of thick, leathery texture, dark green in colour, and blotched with yellow or sometimes with

white or pink. The leaves come directly from rhizomes, the leaf stems being from six inches to a foot long.

PLANTS FOR EDGINGS

For edging a window box or to grow in hanging pots or in vases the best plant I know of is the periwinkle (*Vinca minor*), which makes a slender growth one to two feet long. There is a variegated form of this, the leaves being marked with yellow. A much smaller plant which may be used for the same purpose is *Scirpus cernuus*, but universally known among florists as *Isolepis gracilis*. It has very pretty drooping, grass-like foliage.

Other plants suitable for this purpose are: Wandering Jew (*Tradescantia fluminensis*); Wandering Jew (*Zebrina pendula*); Snake's beard (*Ophiopogon Jaburan*); Variegated panicum (*Oplismenus Burmannii*).

There are two vines which succeed admirably in the house. They are the German ivy (*Senecio scandens*) and the English ivy (*Hedera Helix*). These may be trained around and over the window and I have

seen a whole bay window festooned with them, strings being fastened for them to grow on.

Other foliage plants well worth trying in the house are: Fragrant dragon tree, (*Dracæna fragrans;*) Spotted dragon (*Dracæna Godseffiana*); Dracena (*Cordyline australis*, but known in the trade as *Dracæna indivisa*); Curmeria (*Homalomena Wallisii*); Umbrella plant (*Cyperus alternifolius*); Japanese Daphne (*Daphne odora*); Camellia (*C. Japonica*); Bay tree (*Laurus nobilis*).

THE COMMONEST OF THE HOUSE PALMS

The areca is easily recognized by its yellowish stems and suckering habit. It is not by any means the best house palm, but it is easily grown in a greenhouse and is the commonest offered for sale

THE FIDDLE-LEAVED RUBBER PLANT

One of the strongest and toughest of evergreen house plants, having leaves over two feet long. It grows well under ordinary house conditions

CHAPTER XIV

Reliable Ferns for the Dwelling Rooms

A selection of a round dozen that will endure the same conditions as the best-natured flowering plants — The kinds that anyone can surely grow even in a city flat.

The ferns vie with the rubber plant for first place in the esteem of the window gardener. Their finely cut and sometimes oddly shaped fronds have a graceful airy effect possessed by few other plants. Many people believe that it is impossible to grow ferns in the house or in the window garden, but there are perhaps a couple of dozen which will do very well indeed if given the same care as the flowering plants.

BOSTON AND OTHER SWORD FERNS

The most popular fern is the common sword fern (*Nephrolepis exaltata*). The type is rarely seen in the florist's shops it having been superseded by the Boston fern (*N. exaltata*, var. *Bostoniensis* of the trade).

This is the best of all the sword ferns.

Even when young in small pots the plants are attractive, but as they make a fairly rapid growth one does not have to wait long to obtain a large plant. The fronds of the Boston fern are two to three feet long and two to three inches across, and of a rich green colour. Unlike most of the ferns this will stand some abuse. With all the other ferns if the soil once becomes dry the plant is ruined for the season at least, if not absolutely killed; but should your sword fern be neglected for a day or two, becoming dry, it will recover if carefully looked after.

Another variety of the exaltata which has given satisfaction in many window gardens is known in the trade as *N. Philippensis*. The fronds are smaller, being only about eighteen inches long and one and one-half to two inches wide and are very dark green.

Of recent years there have been several new forms of the sword fern introduced to the American trade which have become very popular. The variety *Scotti* is a miniature Boston fern, the fronds being shorter and narrower, thus making a dense, more compact plant.

There are several plumose forms in which

the pinnæ are much divided. The fronds are usually a foot or so long and quite broad. They are known under such trade names as *Piersoni*, *Barrowsi*, *Whitmani*, etc. These do well in the house but with the exception of *Whitmani* the fronds are more or less liable to revert to the type. This is no doubt caused by the trying conditions found in the living room — a dry heat and insufficient light.

There is another sword fern which I always like to grow because of the oddly shaped pinnæ: *Nephrolepis davalliodes*, var. *furcans*. The ends of the pinnæ are divided into spreading points like horns. This plant is equally as strong a grower as the Boston fern but the fronds have a much more drooping habit.

The sword ferns will grow in almost any soil but a well drained sandy loam is best.

THE GLOSSY HOLLY FERN

The glossy, dark green foliage of the holly fern (*Cyrtomium falcatum*) always attracts attention. The upper side of the pinnæ is very dark green, the under side is somewhat lighter green and studded with brown

spots — the spores. The pinnæ are large, four to six inches long and one to two inches broad, the fronds about two feet long and very stiff. Altogether it is very attractive.

DELICATE MAIDENHAIR

The graceful, feathery fronds of the maidenhair ferns always excite interest. The most beautiful one, *Adiantum Farleyense*, often seen in the florists' shops, cannot be grown in the window garden, but there is a good substitute for it in the so-called "hardy Farleyense" (*Adiantum Capillus-Veneris*, var. *imbricatum*). This will withstand the trying conditions of the house just as well as will the Boston fern. I know plants which have lived all winter in a New York City residence, a severe test for any plant. There is a host of related ferns too numerous to mention and moreover they are not reliable as house plants under the ordinary conditions.

The soil in which maidenhair ferns are growing must never be allowed to become dry — the fronds immediately wither and nothing can be done to recuperate them. Should such an accident happen, remove

the injured fronds and keep the plant in as good a condition as possible until the following spring when new growth will be made.

SPIDER FERNS FOR FERN DISHES

The best small ferns for the home are found among the spider ferns (Pteris). The fronds are once divided, the divisions being long and narrow, and pointed.

One of the best of the spider ferns is *P. Cretica*. It grows nearly a foot high. The stalks are straw coloured and the foliage is dark green in the type but there are several varieties some of which have white markings.

Another spider fern very commonly grown is *P. serrulata*, which differs from Cretica in not being such a strong grower, the stalks are brown and the edges of the pinnæ are sharply serrulate or saw edged. Like Cretica, this has many forms, mostly more or less distorted, and to which such descriptive Latin names as cristata, cristata variegata, densa, etc, have been given.

The best variegated fern for the window garden is *Pteris argyræa*. This is somewhat stronger growing than those already

mentioned, but its chief feature is a broad, white band down the middle of each division of the frond.

All the spider ferns are used more for fern dishes than for specimen plants, to which they are, however, admirably suited.

OTHERS OF PROVEN MERIT

One of the shield ferns (*Polystichum angulare*) somewhat resembles the sword ferns. The fronds are from one to two feet long and rather narrow. The pinnæ differ from those of the sword ferns in that they are triangular rather than oblong. This fern seems to withstand the unfavourable condition of the house admirably. Mr. W. H. Taplin, in *American Gardening* for March 10, 1900, reports having known a specimen which flourished in a window garden for ten years!

The hare's foot fern (Polypodium) is always interesting because of its rhizomes. These rest on the ground and are densely covered with long, coarse, yellow hairs. Sooner or later these hang over the edge of the pot and bear a strong resemblance to a rabbit's foot.

Another interesting fern is *Davallia bullata*, usually seen in the form of "fern balls," but equally at home in a pot or on a sphagnum covered board. As a fern ball this fern is particularly interesting. The balls are composed of the rhizomes wrapped around sphagnum moss. The balls are received in this country in December and January and all that is needed to start them into growth is a thorough soaking in water. Have them in a light window, preferably a north one.

GROWING CONDITIONS FOR FERNS

In the coldest weather the temperature in which ferns are growing ought never to go below 55 degrees at night. A raise of temperature during the day of 10 or 15 degrees is sufficient, and surely no living room should be above 70 degrees. A north window or any window which has lots of light and but little or no direct sunlight will suit ferns; the sun injures the delicate fronds.

Ferns do not like a heavy soil, one composed of four parts of a sandy loam, one part sand, and one part manure, will give

good results. For most of the ferns a little leafmould may be added, but I would not add any to the soil in which the sword ferns are to be grown. Pack the soil fairly firm about the roots but do not make it hard. The soil in which ferns are growing must never become dry, neither must it become water-logged. It is a common assumption that, because ferns grow naturally in damp places, they cannot be over-watered, but while the soil in which ferns thrive outdoors may be very damp it is always well drained and aëreated.

Keep the roots cool. This can be easily done by placing the pots in jardinieres or vases and packing damp sphagnum moss about them. If you want to use the plant for table or other decoration it can be removed from the receptacle, used in the decoration, and returned when the occasion is over.

Keep the leaves of the ferns clean. This is best done by syringing them with clear water on all bright days. If done on dull days, there is some danger of the fronds turning black.

Thrips, red spider and mealy bug are very

troublesome, especially in a dry atmosphere. The two former can be kept in check by frequent syringings of water, being sure to hit the under side of the fronds. Spraying once a week with weak tobacco water will probably keep all three of these pests under control, but should the mealy bug be found on the plants it can be removed by following the advice given elsewhere.

CHAPTER XV

Window Gardening Tools and Accessories

With these accessories and such others as may have been mentioned in the preceding pages, one can successfully care for plants.

There are very few tools which one really needs for successful window gardening, although there are a score or more of accessory appliances, each of which has its special application. The dealers' catalogues list these; our present purpose is to indicate only those that one ought to have for ordinary comfort in this work.

Brackets. There are very useful brackets to be had for fastening into the sides of the window casings. Very pretty effects may be had by placing one or two of these on the sides of the window and growing some drooping plant, like the canary bird vine, for instance.

Bulb glasses. A great deal of interest and pleasure may be had, and a lot learned,

from watching a hyacinth bulb develop. This may be done by growing the bulb in a bulb, or hyacinth, glass. This has a rather large base, and draws in toward the top; but nearly at the top the sides suddenly flare out, forming a basin which is just large enough to comfortably hold the largest sized hyacinth bulb. Water is put in these to just touch the bottom of the bulb. The filled glasses are then set away in a cool, dark place until the roots develop.

Fertilizers. None are needed, as a rule, but when feeding becomes desirable apply in solution. Formulas for liquid manure and another for a soluble chemical fertilizer are given on pages 74 and 75, Chapter VI. The prepared plant food tablets, to be had in the seed stores, are thoroughly reliable.

Heaters. Often it is necessary to heat the window, as where the room in which the plants are growing is separated from the living room. Sometimes this can be solved by putting in connections with the regular house heater; but where such connections cannot be made, use an oil heater. These generate a large amount of heat, and will

not injure the plants. Don't use a gas heater under any circumstances, for gas is bound to escape through the connections, and nothing is so injurious to plants as is gas. For the very small greenhouse there are small forms of hot water boilers which are economical of fuel, and give a large amount of heat.

Knife. A good budding knife, costing about $1.25, should be kept on hand for making cuttings, etc., and used for this purpose only. Keep it with a keen edge, to make clean cuts.

Pans. When growing bulbs use pans which are made especially for this purpose. They are not as deep as pots of the same diameter would be. For instance, a pot eight inches in diameter would be eight inches deep; but a pan of that same diameter would be only about half as deep. This is plenty deep enough for bulbs, as it furnishes plenty of root room and they are more attractive, not showing such an expanse of red clay. These pans are also very useful for starting seeds.

Pots. They must be good. There are a great many pots on the market which are so thin that they are very easily broken.

Avoid these, and get such as have sides that are thick and which are well baked. Buy "standard" pots which are of uniform size and shape, so that they nest well, taking up less room, and are less liable to be broken when stored.

For growing hyacinths, where one only is wanted in a pot, as for forcing, use the so-called hyacinth pots. These are deep, five-inch pots, an inch or so deeper than the ordinary five-inch pot, and give much more room for soil. This extra room for soil is really necessary if one wishes to make the most of hyacinths.

Pot covers. Many times it is desirable to cover up a pot, particularly when using a potted plant as a prominent part of the decorations about the house. The best thing for this is a jardinière. This can be had in many different sizes, shapes, and prices. The best, to my mind, is of unglazed clay, decorated with gilt dragons and similar figures, made by the Japanese. Cheaper forms of domestic manufacture can be had in glazed pottery.

Very pretty effects can be had by using crêpe paper and ribbons. This paper can

be had in almost any colour imaginable, but as a rule I think the green paper is best.

Then there are collapsible paper pot covers. These are eight or many sided affairs, in which the pot can be set and removed when the occasion for it is over, and the plant set back in the window to recuperate.

Of late the florists have been displaying baskets for covering the pots. They can be had in a number of different colours and shapes. The first time I saw them I exclaimed: "What funny little waste baskets!" I think that perhaps this will give you some idea of what they look like. They are certainly very ornamental affairs, and for the amount of use which one may get out of them they are not expensive. They are more artistic than most of the common glazed jardinières sold by the department stores, and there is not so very much difference in their cost.

Potting tools. A trowel will often prove handy, and so will a screen for sifting the soil. This should be three mesh to the inch. A temporary bench for potting will be handy if you have much potting to do.

Soil for potting can usually be purchased from a nearby florist at a cheaper price than you can secure it otherwise, so that the bench need not be so large as would be the case if you mixed the soil at home.

A potting stick, for tamping the soil, is most desirable. It is described on page 32.

Raffia, etc. For tying up the plants use raffia, a soft straw-like tying material made from a palm, which can be purchased from the seedsmen for about twenty cents a pound; and a pound will last a long time. Raffia tape is also good. It is a broad green tape made especially for the purpose. There is also dark green linen string which is very useful. It is the best thing to put up for smilax and asparagus to grow on.

Saucers should be put under each pot to save the drip from the plants when watering, but do not allow water to accumulate in them.

Sphagnum. Sphagnum moss should always be kept on hand; it is useful for a great variety of purposes, such as putting over the broken crock in the bottom of the pot to keep the soil from sifting down and clogging the drainage. Fine siftings are

put on the top of the soil in seed pans for germinating fine seeds like gloxinia, calceolaria, tuberous begonia, etc. Used also for pot-layering rubber plants.

Sprayers. A very handy little brass sprayer is sold by the seedsmen, which will thoroughly distribute kerosene emulsion, tobacco water, or other insecticide. For syringing the plants with water the best thing is the ordinary bulb syringe; but for larger plants there is a brass syringe holding a quart or so which will prove very effective when ridding the plants of mealy bug or red spider, because the spray can be applied with much force.

Stands. For holding plants, where one has more than can be put on the window-sill, there are a great variety of plant-stands in the market. Some are circular, some are semi-circular, others straight, but all are arranged in the form of steps. These are made of wood or iron. Plant stands are all right, I suppose, but I never have cared for them, as plants which are grown on them are very apt to be one-sided, because they are usually far from the light, and the grower neglects to turn them around fre-

FORCING WITH ETHER

The whole process is detailed in Chapter XVI. The dormant shrubs are put into an air-tight vessel and exposed to the vapor of ether. They are then ready to grow immediately, and will flower exactly as though forced in a greenhouse. The plants illustrated are deutzia and lilac, the centre panel showing how the plant looked before treatment with ether

A COLLECTION OF HOUSE PLANTS

Boston fern, dracena, palms, and Norfolk Island pine were grown in this sunny living room for many years, with continually increasing vigour

quently. Still, if you have no other means of holding, use a stand, but get it as near the window as possible, and slightly turn the plant each day so that all sides will get an equal amount of light.

Trellis. For training weak-stemmed plants a trellis of some sort is often handy. This may be made from small, square wood stakes, or from wire. Either form is good.

Wardian case. A Wardian case is practically a greenhouse of small dimensions, say 2 x 3 x 2½ feet. It is made entirely of glass with a wooden frame. Usually a pitch roof is put on it; the sides of the roof being hung on the ridge pole by hinges so that the inside of the case is accessible. In the bottom of these cases is a zinc pan for the earth. The plants are set in this, watered, and the case closed. The moisture transpired by the foliage and evaporated by the soil condenses on the glass and drops back. As a result, there is always a humid atmosphere in these cases, and but little watering has to be done. Where conditions will not permit of the culture of ferns in the open room, they can be grown most successfully in Wardian cases.

Watering pot. A well-conducted indoor garden ought not to be without a good watering pot. It is not necessary, however, to have one of those big affairs such as are often used outdoors. There are small ones, holding a couple of gallons which are much more easily handled. They may be had in either galvanized iron or copper. I prefer the copper one, as it can be kept in much better condition than an iron one, and with ordinary care they will last a lifetime. The nozzle should be fitted with two roses of different sized holes, one with very small holes. To insure that the joint between them is tight insist on the nozzle or spout being fitted with threads that the "roses" may be screwed on.

Window boxes for the window-sill are sometimes used in window gardening. They are useful, especially where one wishes to plunge pots in cool, damp moss. These can be made of plain wood, or of metal tiles, and supported on brackets.

CHAPTER XVI

Ether Forcing Without a Greenhouse

An easy way for the amateur who has no greenhouse to bloom azaleas, lilacs, and other plants — Great opportunity for the window gardener to discount the seasons.

The ability to force plants out of season, without the application of heat, but by freezing by means of ether, is not a theory. It has been done successfully by several people; but I must confess to having had no experience of it myself. Still, the account of it given by Mrs. Flora L. Marble in The *Garden Magazine* for September, 1905, is circumstantial enough, and convincing. To quote:

"Success crowned our attempt at forcing by ether. We had flowers for Christmas just like those of the stores which had been forced by the expensive florist's greenhouse, heated by steam or water. Our apparatus was only a little bottle of ether, an old washboiler for small plants, and an

old-fashioned chest for the shrubs. Actual cash outlay fifteen cents a plant! After the ether treatment the plants were subject to all the discomforts that commonly fall to the lot of house plants during winter.

"The old-fashioned chest, with dovetailed corners and double boards on the sides and bottom, was lined with heavy paper and all suggestions of cracks were filled with putty. The lid was removed, and the chest was placed upside down on the cellar floor and banked around with earth. A hole was drilled for the funnel through which the ether was poured. Inside was a sponge and a small basin under the sponge to hold the ether, while the sponge continually soaked it up and aided evaporation. This chest contained about fifty-six gallons space and we used four ounces of ether for the dose — that is the approved ratio. The hole was tightly plugged after the funnel was withdrawn.

"We chose for our experiment two azaleas, Vervæniana, and Simon Mardner; two lilacs, Marie le Gray and Charles X.; two deutzias.

"November 4th the plants arrived from the nursery. They were potted at once in

dry earth — that is important, *dry* earth — and put under the chest packed like cord-wood, their branches still tied, and cloth bound about the pots to hold the soil. The ether was poured in and the plants remained for seventy-two hours. What a sorry sight as they were removed from the forcing chest!" These plants that were to be a joy at Christmas — and it was already November 7th!

"The Marie le Gray lilac, a bare shrub, looked unaltered, but there was a smell of ether about the dirt when it was watered that was hopeful.

"The other lilac, Charles X., is notoriously hard to force. So it was left dry and bewrapped on the cellar floor to rest a couple of days before going into the chest for another dose of ether.

"Look at the azaleas! Vervæniana, that had been of so shiny a green when put in the chest, now had the lower leaves a rich crimson, while the top of the plant remained green — as our sumach does in the fall. It followed the lilac upstairs. Simon Mardner showed no signs of a change of heart, so we put it back to rest with the Charles X. lilac.

One of the deutzias was watered and sent to join the promising ones; the other was wrapped up and treated once more.

"Then we began to quake. Finally we did the thing only half way, which is very foolish always. Charles X., Simon Mardner, and the deutzia were put back in the chest bravely enough, but when we came to pour in the ether we stopped at two ounces.

"On the evening of the 12th, having been in the chest three days, these plants were once more brought into fresh air and daylight. The lilac and deutzia were in no wise altered, but Simon Mardner had folded its small green leaves close to the branches — as a clover plant will at night.

"Azalea Vervæniana began to lose the crimson leaves, and many of the green leaves fell off. This dropping of the foliage continued until December 3rd, when the plant began to grow like a miracle. The flower buds, that had been nestling in the tips of the branches, swelled and doffed the russet caps that covered their pink glory. December 13th found the first blossom fully open. By Christmas time the plant was a thing to marvel at. The flowers were large and perfect, crowding each

other in the shape of an old-fashioned bouquet, and the plant was beautiful all through January, when it was cut back, to make a new growth for next season.

"After it had been upstairs a day or so, azalea Simon Mardner waked up and straightened out its folded leaves, and many of them fell off. The flower buds showed colour on December 15th, and after that the plant took up a great pace, and by Christmas time most of the flowers were fully open. They are just the color of the American Beauty rose, having a richness of tone that Vervæniana lacks; but, for all of that, we prefer the pale pink of the latter. Vervæniana rather likes sunshine, and will live comfortably in a warm room. Simon Mardner, on the other hand, hates sunshine even more than artificial heat. In spite of being too warm sometimes, it kept its good looks through January, but by the middle of February was dead. Dead from overwork and rush, no doubt.

"Our most delightful success was with the Marie le Gray lilac. In four days the leaf buds began to swell. The first week in December the white flowers began to unfold; by the 10th of the month the flowers were

full blown, and hung there, unchanging, to the last day of the month.

"We have different things to say of Charles X. The person who christened it must have known what the history books say of that French Charles X: 'His policy was bigoted and reactionary. It excited much discontent.' Of no Charles X. was this remark ever more true than of the one who occupied our sunny window after November 12th. It came into leaf, but the flowers never developed.

"The deutzias remained unpromising until about December 3rd, when a faint show of green could be detected along the branches of the plant that had had two treatments. The other remained dormant. By Christmas Day all the lower flowers were in full bloom, while those at the tips of the branches were still tiny buds. The leaves did not grow much until the flowers were out. The photographs were taken at Christmas time to show the relative condition. (see plate).

"All the plants had the same treatment from the time the dopes ended. They were taken to the third floor, where the hall widens out into what we call the sun parlour. Here

the windows face south and east and west. The light is diffused, and there are no draughts. At night the temperature would often go down to 35 degrees or 40 degrees. On a few very cold nights we huddled our patients about the radiator, with a screen around them to keep off the cold air which might come up the stairway. In the daytime the temperature averaged about 65 degrees, sometimes climbing up to 70 degrees.

"When the plants were beginning to bloom they were watered every four or five days with weak manure water. There is a great difference in the thirst of the various plants. Water them when the soil on top gets dry, not before, though there is a great temptation so to do when the plant in the next crock needs a drink. The deutzias were only watered about once a week, but the lilacs and azaleas needed water every day. The plants that were not dosed did not take as much water, for they were not growing as fast.

"If we had been working in a hothouse, and could have started early enough, it would have been possible to get the same results.

The use of anæsthetics shortens the time of forcing twenty to thirty days.

THE ITEMS OF COST AND PROFIT

2 azaleas [12-inch plants], named varieties . .	$1.50
2 lilacs [Marie le Gray and Charles X.] . . .	2.00
2 *Deutzia Lemoinei*	1.50
Ether [average 15 cents per plant]	.90
	$5.90

"For less than $6 and practically no work we had flowering plants at Christmas worth $15 to $20. Ether sells at 75 cents a pound.

CHAPTER XVII

A Window Gardener's Calendar

A practical year's programme of operations based on actual experience (see also pages 6 to 9).

The seasons' operations are set forth in the following paragraphs beginning with September, because that is the time when one's interest is naturally transferred from the outdoors garden. The preparations for winter bloom, then, begin with the arrival of the Dutch bulbs.

September — Start first set of Dutch bulbs and various types of narcissus — lift and repot house plants from frame the second week. The narcissus will bloom before Christmas; the tulips and hyacinths at Christmas time.

Continue planting at intervals of two weeks for succession; first, second, third and fourth sets of tulips may be found in La Reine, Yellow Prince, Rose Grisdelin, and Pottebakker types — Hyacinths, Ida,

Baron van Thuyll, for earliest. Unnamed sorts are less expensive, and do just as well for later flower. Grow the white alba superbissima for Easter. Polyanthus narcissus are best for Christmas, and the Trumpet types for later.

October — Lift chrysanthemums and start in the house. Last of the month plant *Gladiolus Colvillei*. Blushing Bride gladiolus flowers six weeks earlier than The Bride and rubra. The latter may be set in January for May flowers. Gladiolus require a gentle bottom heat to start growth quickly.

February — Take cuttings of Paris daisies, chrysanthemums, and begonias, for flowers in October and later.

Much expense may be saved if small greenhouse plants are bought at this season, and grown through the summer to maturity.

March — Sow Ostrich Plume chrysanthemums and Chaubaud's carnations, for flowers in October and later.

Carnations of this strain will bloom continuously throughout the winter.

April — Sow seeds of cinerarias for March flowers, and Chinese primrose seeds for Christmas flowers.

Cinerarias will flourish in spite of hot summer weather, if planted in a deep-framed pit slanting north with a muslin shade over the top.

May — Plant out in coldframe all house plants by the middle of the month.

Unpot plants and place in the earth in bottomless cardboard or wooden boxes. The plants will grow all the stronger for this, and the cardboard straight-jackets will check the roots from spreading.

June—For flowers in October and later, disbud chrysanthemums and roses until the middle of August. Pinch off outside shoots around forming azalea buds; the buds will be crowded and blast if you neglect this.

July—Sow calceolaria seed and buy Gloire de Lorraine begonia plants. The begonias will flower in December, the calceolarias in March.

Treat calceolaria the same as primrose and cineraria—the tall-growing hybrida type is the handsomest.

August—Pot Easter lilies and freesias; take cuttings from Paris daisies and heliotrope; sow cineraria again. The lilies and

freesias will flower by Christmas; the others from January on.

By planting freesias among lilies or other slow-maturing flowers, they will bloom before the lilies, and break the monotony of waiting. If planted two inches deep, the nuisance of staking is avoided.

CHAPTER XVIII

Plants in the Aquarium

Although the popular acceptance of the aquarium is a contrivance for the purpose of keeping fish, yet the fact is that plant growth is essential for the proper balancing of the life in the tank. Thus the aquarium becomes an appropriate adjunct to the house plants and window garden. The plants maintain the supply of oxygen in the water that is necessary for the life of the fish, and the pleasure to be derived from watching the growth of the animal and plant life together in a properly balanced aquarium opens up a different field of interest to the plant lover.

There are in fact comparatively few plants for growing in an indoor aquarium, but they differ so radically from the usual potted window plant as to create a new world, as it were. In the ordinarily small tank only two or three of the commoner things are to be usually found, particularly eel-grass, water-milfoil, and fanwort. The fanwort alone is

the most suitable plant for a very small aquarium where there is no room for variety.

But first a word as to the aquarium itself.

Generally speaking, the properly equipped aquarium consists of a rectangular glass tank, one corner of which holds a small piece of glass puttied to its side making a place for refuse. A rich alluvial soil in which the plants may flourish is a prime essential. This is so placed in the aquarium as to slope gently toward the refuse corner. And over it a layer of perfectly clean sand is placed, which prevents the water from being discolored. However, before being put into the aquarium the sand must be thoroughly washed. Take a shallow pan, place a handful of sand in it and hold over a faucet so that a small stream of water stirs up the sand vigorously; gently rock the pan, allowing the floating particles of dust and dirt to escape over the rim. Keep repeating this process until there is sufficient cleansed sand to make a layer approximately an inch thick in the aquarium.

Most plants will not, as a rule, remain green after transplanting, therefore it is best to use the tips, for only that part of the plant which

has grown in the aquarium will retain its color. This is true of water-weed (*Elodea*), fanwort (*Cabomba*), mud-plantain (*Heteranthera*), water-milfoil (*Myriophyllum*), and others. A few of these plants are usually bunched together and placed in a hole bored in the sand so that they project upward only half an inch, the sand being firmly pressed down around them. Eel-grass (*Vallisneria*) and arrowhead (*Sagittaria*) are cut back to within an inch or two of the roots and then placed in the finger bored holes. Plant only half of the aquarium, leaving the side containing the refuse corner free.

Water may now be poured into the aquarium. First place a sheet of paper over the refuse corner to prevent the sand from being disturbed, and then gently pour the water upon the paper until the tank is about one third full. The remainder of the water may be siphoned in with a small rubber hose, a bucket of water being stood on the edge of the aquarium to facilitate this operation.

Within two or three weeks, the vegetation has made roots and the plants will have grown a little, and fish may then be placed

in the aquarium. A convenient method of computing the number of fish an aquarium will hold is to allow a quart of water for every fish two inches in length. The tank must stand in or near a window where there is plenty of light.

Fish bowls, commonly called "goldfish bowls," are the worst possible containers in which fish can be kept. They are in reality veritable torture bowls. These tanks are provided with but one small opening which keeps the carbon-dioxide in the water so that it quickly accumulates; moreover, this small opening prevents a sufficient quantity of oxygen from filtering through the water to counteract, to any extent, the carbon-dioxide gas. The one or two sprigs of greenery usually found in these bowls are more ornamental than of any practical use. Carbon-dioxide is used by the plant in the process of making food. During this process—which takes place only in the daytime—oxygen is given off as a waste product. At night the plant uses for respiration some of the oxygen which is produced by day. Now it can easily be conceived that since no plant grows in these goldfish bowls, carbon-dioxide is the prominent gas in

the water. This is the reason why the fish invariably stay near or at the top of such torture bowls, gasping for air at the surface. And they are slowly asphyxiated.

Another reason for the rapid death of the fish in these bowls is the fact that a continual changing of water is necessary to keep the water fresh, pure, and clear. This is done away with entirely in the oblong aquarium where plants are grown. The only thing necessary in such a balanced aquarium is occasionally to add water to counterbalance evaporation.

Available aquarium plants may be procured either from aquarium fish specialists or from such florists and nurserymen as specialize in aquatic plants for outdoor water gardens (i. e., water lilies, lotuses etc.) Those generally listed include the following:

Arrowhead (*Sagittaria natans*); Canadian water-weed (*Elodea canadensis*); eel-grass (*Vallisneria spiralis*); fanwort (*Cabomba caroliniana*); floating moss (*Azolla caroliniana*); Frog-bit (*Hydrocharis morsus-ranae*); mud plantain (*Heteranthera*); umbrella grass (*Cyperus alternifolius*); pond weed (*Potamogeton crispus*); water aloe (*Stratiotes aloides*); water lettuce (*Pistia stratiotes*); water mil-

foil (*Myriophyllum heterophyllum*); water poppy (*Limnocharis emarginata*); water purslane (*Ludwigia palustris*); Water starwort (*Callitriche verna*); Water violet (*Hottonia palustris*).

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